Ontology-based Expert System for a Generic Drug Production of Pharmaceutical Dosage Forms

Test Plan

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# Unit Test

## SolubilityServiceImpl Class

### Unit Test Case 01 (UTC -01)

add(Solubility solubility): Solubility

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | SolubilityValue |
| Solubility1 | 1 | “solubility1” | 4 | 2 | 5 |
| Solubility2 | 2 | “solubility2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | | Expect Result | | | | |
| Id | Type | MaxValue | MinValue | SolubilityValue | Id | Type | MaxValue | MinValue | SolubilityValue |
| 1 | Test add solubility object which is correct the formal of solubility object. | null | “solubility3” | 4 | 4 | 2 | Not null | “solubility3” | 4 | 4 | 2 |
| 2 | Test add solubility object which is correct the formal of solubility object. | null | “solubility4” | 6 | 3 | 6 | Not null | “solubility4” | 6 | 3 | 6 |
| 3 | Test add solubility object which is contained in the database already. | 1 | “solubility1” | 4 | 2 | 5 | null | null | null | null | Null |
| 4 | Test add solubility object which is contained in the database already. | 2 | “solubility2” | 7 | 1 | 3 | null | null | null | null | null |

### Unit Test Case 02 (UTC -02)

update(Solubility solubility): Solubility

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | SolubilityValue |
| Solubility1 | 1 | “solubility1” | 4 | 2 | 5 |
| Solubility2 | 2 | “solubility2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | | Expect Result | | | | |
| Id | Type | MaxValue | MinValue | SolubilityValue | Id | Type | MaxValue | MinValue | SolubilityValue |
| 1 | Test update solubility object which is correct the formal of solubility object and and contained in the database. | 1 | “solubility1” | 6 | 4 | 3 | 1 | “solubility1” | 6 | 4 | 3 |
| 2 | Test update solubility object which is correct the formal of solubility object and and contained in the database. | 2 | “solubility2” | 7 | 3 | 10 | 2 | “solubility2” | 7 | 3 | 10 |
| 3 | Test update solubility object which is not contained in the database. | 3 | “solubility3” | 2 | 1 | 3 | null | null | null | null | null |
| 4 | Test update solubility object which is not contained in the database. | 4 | “solubility4” | 3 | 2 | 5 | null | null | null | null | null |

### Unit Test Case 03 (UTC -03)

**delete(Solubility solubility): Solubility**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | SolubilityValue |
| Solubility1 | 1 | “solubility1” | 4 | 2 | 5 |
| Solubility2 | 2 | “solubility2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | | Expect Result | | | | |
| Id | Type | MaxValue | MinValue | SolubilityValue | Id | Type | MaxValue | MinValue | SolubilityValue |
| 1 | Test delete solubility object which is contained in database and correct format solubility object. | 1 | “solubility1” | 4 | 2 | 5 | Null | “solubility1” | 4 | 2 | 5 |
| 2 | Test delete solubility object which is contained in database and correct format solubility object. | 2 | “solubility2” | 7 | 3 | 10 | null | “solubility2” | 7 | 1 | 3 |
| 3 | Test delete solubility object which is not contained in database or incorrect format solubility object. | 3 | “solubility3” | 4 | 1 | 3 | null | null | null | null | Null |
| 4 | Test delete solubility object which is not contained in database or incorrect format solubility object. | 4 | “solubility4” | 3 | 2 | 6 | null | null | null | null | null |

### Unit Test Case 04 (UTC -04)

**findAll():Solubility []**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | SolubilityValue |
| Solubility1 | 1 | “solubility1” | 4 | 2 | 5 |
| Solubility2 | 2 | “solubility2” | 7 | 1 | 3 |

**Test Plan**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of solubility object |
| 1 | Test get all solubility list | { Solubility1, Solubility2} |

### Unit Test Case 05 (UTC -05)

findById(long id):Solubility

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | SolubilityValue |
| Solubility1 | 1 | “solubility1” | 4 | 2 | 5 |
| Solubility2 | 2 | “solubility2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | Expect Result | | | | |
| Id | Id | Type | MaxValue | MinValue | SolubilityValue |
| 1 | Test get solubility object which is contained in database by solubility id. | 1 | 1 | “solubility1” | 4 | 2 | 5 |
| 2 | Test get solubility object which is contained in database by solubility id. | 2 | 2 | “solubility2” | 7 | 1 | 3 |
| 3 | Test get solubility object which is not contain in database by solubility id. | 3 | null | Null | Null | Null | Null |
| 4 | Test get solubility object which is not contain by solubility id in database. | 4 | null | Null | Null | Null | Null |

### Unit Test Case 06 (UTC -06)

findByType(String type):Solubility

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | SolubilityValue |
| Solubility1 | 1 | “solubility1” | 4 | 2 | 5 |
| Solubility2 | 2 | “solubility2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | Expect Result | | | | |
| Solubility Type | Id | Type | MaxValue | MinValue | SolubilityValue |
| 1 | Test get solubility object which is contained in the database by solubility type. | “solubility1” | 1 | “solubility1” | 4 | 2 | 5 |
| 2 | Test get solubility object which is contained in the database by solubility type. | “solubility2” | 2 | “solubility2” | 7 | 1 | 3 |
| 3 | Test get solubility object which is not contain in database by solubility type. | “solubility3” | Null | Null | Null | Null | Null |
| 4 | Test get solubility object which is not contain in database by solubility type. | “solubility4” | Null | Null | Null | Null | Null |

## DegradationMechinismServiceimpl Class

### Unit Test Case 07 (UTC -07)

**add(DegradationMechinism degradationMechinism): DegradationMechinism**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| DegradationMechinism1 | 1 | “degradationMechinism1” |
| DegradationMechinism2 | 2 | “degradationMechinism2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test adddegradationMechinism object which is correct the formal of degradationMechinism object. | null | “degradationMechinism3” | Not null | “degradationMechinism3” |
| 2 | Test add degradationMechinismobject which is correct the formal of degradationMechinism object. | null | “degradationMechinism4” | Not null | “degradationMechinism4” |
| 3 | Test add degradationMechinism object which is contained in the database already. | 1 | “degradationMechinism1” | null | Null |
| 4 | Test add degradationMechinism object which is contained in the database already. | 2 | “degradationMechinism2” | null | Null |

### Unit Test Case 08 (UTC -08)

**update(DegradationMechinism degradationMechinism ):DegradationMechinism**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| DegradationMechinism1 | 1 | “degradationMechinism1” |
| DegradationMechinism2 | 2 | “degradationMechinism2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test update degradationMechinism object which is correct the formal of degradationMechinism object and contained in the database. | 1 | “degradationMechanismTest1” | 1 | “degradationMechanismTest1” |
| 2 | Test update degradationMechinism object which is correct the formal of degradationMechinism object and contained in the database. | 2 | “degradationMechanismTest2” | 2 | “degradationMechanismTest2” |
| 3 | Test update degradationMechinism object which is not contained in the database. | 3 | “degradationMechanismTest3 | null | Null |
| 4 | Test update degradationMechinism object which is not contained in the database. | 4 | “degradationMechanismTest4” | null | Null |

### Unit Test Case 09 (UTC -09)

**Delete(DegradationMechinism degradationMechinism): DegradationMechinism**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| DegradationMechinism1 | 1 | “degradationMechinism1” |
| DegradationMechinism2 | 2 | “degradationMechinism2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test delete degradationMechinism object which is contained in database and correct format degradationMechinism object. | 1 | “degradationMechinism1” | Null | “degradationMechinism1” |
| 2 | Test delete degradationMechinism object which is contained in database and correct format degradationMechinism object. | 2 | “degradationMechinism2” | null | “degradationMechinism2” |
| 3 | Test delete degradationMechinism object which is not contained in database or incorrect format degradationMechinism object. | 3 | “degradationMechinism3” | null | Null |
| 4 | Test delete degradationMechinism object which is not contained in database or incorrect format degradationMechinism object. | 4 | “degradationMechinism4” | null | Null |

### Unit Test Case 10 (UTC -10)

**findAll():degradationMechinism []**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| DegradationMechinism1 | 1” | “degradationMechinism1” |
| DegradationMechinism2 | 2 | “degradationMechinism2” |

**Test Case**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of degradationMechinism object |
| 1 | Test get all degradationMechinism list. | {DegradationMechinism1,DegradationMechinism2} |

### Unit Test Case 11 (UTC -11)

**findById(long id):degradationMechinism**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| DegradationMechinism1 | 1 | “degradationMechinism1” |
| DegradationMechinism2 | 2 | “degradationMechinism2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Id | Id | Type |
| 1 | Test get degradationMechinism object by degradationMechinism id . | 1 | 1 | “degradationMechanism1” |
| 2 | Test get degradationMechinism object by degradationMechinism id. | 2 | 2 | “degradationMechanism2” |
| 3 | Test get degradationMechinism object which is not contain in database. | 3 | null | Null |
| 4 | Test get degradationMechinism object which is not contain in database. | 4 | null | null |

### Unit Test Case 12 (UTC -12)

**findByType(String type):degradationMechinism**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| DegradationMechinism1 | 1 | “degradationMechinism1” |
| DegradationMechinism2 | 2 | “degradationMechinism2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| type | Id | Type |
| 1 | Test get degradationMechinism object by degradationMechinism type. | “degradationMechanism1” | 1 | “degradationMechanism1” |
| 2 | Test get degradationMechinism object by degradationMechinism type. | “degradationMechanism2” | 2 | “degradationMechanism2” |
| 3 | Test get degradationMechinism object which is not contain in database. | “degradationMechanism3” | null |  |
| 4 | Test get degradationMechinism object which is not contain in database. | “degradationMechanism4” | null |  |

## KineticReactionServiceimpl Class

### Unit Test Case 13 (UTC -13)

**add(KineticReaction kineticReaction): KineticReaction**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| KineticReaction1 | 1 | “kineticReaction1” |
| KineticReaction2 | 2 | “kineticReaction2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test add kineticReaction object which is correct the formal of kineticReaction object. | null | “kineticReaction3” | Not null | “kineticReaction3” |
| 2 | Test add kineticReaction object which is correct the formal of kineticReaction object. | null | “kineticReaction4” | Not null | “kineticReaction4” |
| 3 | Test add kineticReaction object which is contained in the database already. | 1 | “kineticReaction1” | null |  |
| 4 | Test add kineticReaction object which is contained in the database already. | 2 | “kineticReaction2” | null |  |

### Unit Test Case 14 (UTC -14)

**update(KineticReaction kineticReaction): KineticReaction**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| KineticReaction1 | 1 | “kineticReaction1” |
| KineticReaction2 | 2 | “kineticReaction2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test update kineticReaction object which is correct the formal of kineticReaction object. | 1 | “kineticReactionTest1” | 1 | “kineticReactionTest1” |
| 2 | Test update kineticReaction object which is correct the formal of kineticReaction object. | 2 | “kineticReactionTest2” | 2 | “kinecticReactionTest2” |
| 3 | Test update kineticReaction object which is not contained in the database. | 3 | “kineticReaction3 | null |  |
| 3 | Test update kineticReaction object which is not contained in the database. | 4 | “kineticReaction4” | null |  |

### Unit Test Case 15 (UTC -15)

**Delete(KineticReaction kineticReaction): KineticReaction**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| KineticReaction1 | 1 | “kineticReaction1” |
| KineticReaction2 | 2 | “kineticReaction2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test delete kineticReaction object which is contained in database and correct format kineticReaction object. | 1 | “kineticReaction1” | Null | “kineticReaction1” |
| 2 | Test delete kineticReaction object which is contained in database and correct format kineticReaction object. | 2 | “kineticReaction2” | Null | “kineticReaction2” |
| 3 | Test delete kineticReaction object which is not contained in database or incorrect format kineticReaction object. | 3 | “kineticReaction3” | null | Null |
| 3 | Test delete kineticReaction  object which is not contained in database or incorrect format kineticReaction object. | 4 | “kineticReaction4” | null | null |

### Unit Test Case 16 (UTC -16)

**findAll():KineticReaction []**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| KineticReaction1 | 1 | “kineticReaction1” |
| KineticReaction2 | 2 | “kineticReaction2” |

**Test Case**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of kineticReaction object |
| 1 | Test get all kineticReaction object list. | {KineticReaction1,KineticReaction2} |

### Unit Test Case 17 (UTC -17)

**findById(long id):** **KineticReaction**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| KineticReaction1 | 1 | “kineticReaction1” |
| KineticReaction2 | 2 | “kineticReaction2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Id | Id | Type |
| 1 | Test get kineticReaction object by kineticReaction id . | 1 | 1 | “kineticReaction1” |
| 2 | Test get kineticReaction object by kineticReaction id. | 2 | 2 | “kineticReaction2” |
| 3 | Test get kineticReaction object which is not contain in database. | 3 | null |  |
| 4 | Test get object kineticReaction which is not contain in database. | 4 | null |  |

### Unit Test Case 18 (UTC -18)

**findByType(String type):** **KineticReaction**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| KineticReaction1 | 1 | “kineticReaction1” |
| KineticReaction2 | 2 | “kineticReaction2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Type | Id | Type |
| 1 | Test get kineticReaction object by kineticReaction type. | “kineticReaction1” | 1 | “kineticReaction1” |
| 2 | Test get kineticReaction object by kineticReaction type. | “kineticReaction2” | 2 | “kineticReaction2” |
| 3 | Test get kineticReaction object which is not contain in database. | “kineticReaction3” | Null | Null |
| 4 | Test get kineticReaction object which is not contain in database. | “kineticReaction4” | Null | Null |

## PkaServiceImpl Class

### Unit Test Case 19 (UTC -19)

**add(Pka pka): Pka**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | PkaValue |
| Pka1 | 1 | “pka1” | 4 | 2 | 5 |
| Pka2 | 2 | “pka2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | | Expect Result | | | | |
| Id | Type | MaxValue | MinValue | PkaValue | Id | Type | MaxValue | MinValue | PkaValue |
| 1 | Test add pka object which is correct the formal of pka object. | null | “pka3” | 4 | 4 | 2 | Not null | “pka3” | 4 | 4 | 2 |
| 2 | Test add pka object which is correct the formal of pka object. | null | “pka4” | 6 | 3 | 6 | Not null | “pka4” | 6 | 3 | 6 |
| 3 | Test add pka object which is contained in the database already . | 1 | “pka1” | 4 | 2 | 5 | null | null | null | null | null |
| 4 | Test add pka object which is contained in the database already. | 2 | “pka2” | 7 | 1 | 3 | null | null | null | null | null |

### Unit Test Case 20 (UTC -20)

**update(Pka pka):Pka**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | PkaValue |
| Pka1 | 1 | “pka1” | 4 | 2 | 5 |
| Pka2 | 2 | “pka2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | | Expect Result | | | | |
| Id | Type | MaxValue | MinValue | PkaValue | Id | Type | MaxValue | MinValue | PkaValue |
| 1 | Test update pka object which is correct the formal of pka object and contained in the database. | 1 | “pka1” | 4 | 1 | 5 | 1 | “pka1” | 4 | 1 | 5 |
| 2 | Test update pka object which is correct the formal of pka object and contained in the database. | 2 | “pka2” | 7 | 3 | 10 | 2 | “pka2” | 7 | 3 | 10 |
| 3 | Test update pka object which is not contained in the database. | 3 | “pka3” | 2 | 1 | 3 | null |  |  |  |  |
| 3 | Test update pka object which is not contained in the database. | 4 | “pka4” | 3 | 2 | 5 | null |  |  |  |  |

### Unit Test Case 21 (UTC -21)

**delete(Pka pka):Pka**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | PkaValue |
| Pka1 | 1 | “pka1” | 4 | 2 | 5 |
| Pka2 | 2 | “pka2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | | Expect Result | | | | |
| Id | Type | MaxValue | MinValue | PkaValue | Id | Type | MaxValue | MinValue | PkaValue |
| 1 | Test delete pka object which is contained in database and correct format Pka object. | 1 | “pka1” | 4 | 2 | 5 | Null | “pka1” | 4 | 2 | 5 |
| 2 | Test delete pka object which is contained in database and correct format pka object. | 2 | “pka2” | 7 | 1 | 3 | Null | “pka2” | 7 | 1 | 3 |
| 3 | Test delete pka object which is not contained in database or incorrect format pka object. | 3 | “pka3” | 4 | 1 | 3 | null | Null | Null | Null | Null |
| 3 | Test delete pka object which is not contained in database or incorrect format pka object. | 4 | “pka4” | 3 | 2 | 6 | null | Null | Null | Null | Null |

### Unit Test Case 22 (UTC -22)

**findAll():Pka []**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | PkaValue |
| Pka1 | 1 | “pka1” | 4 | 2 | 5 |
| Pka2 | 2 | “pka2” | 7 | 1 | 3 |

**Test Plan**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of pka object |
| 1 | Test get all pka list. | {Pka1,Pka2} |

### Unit Test Case 23 (UTC -23)

**findById(long id):Pka**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | PkaValue |
| Pka1 | 1 | “pka1” | 4 | 2 | 5 |
| Pka2 | 2 | “pka2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | Expect Result | | | | |
| Id | Id | Type | MaxValue | MinValue | PkaValue |
| 1 | Test get pka object by pka id . | 1 | 1 | “pka1” | 4 | 2 | 5 |
| 2 | Test get pka object by pka id. | 2 | 2 | “pka2” | 7 | 1 | 3 |
| 3 | Test get pka object which is not contain in database. | 3 | Null | Null | Null | Null | Null |
| 4 | Test get pka object which is not contain in database. | 4 | Null | Null | Null | Null | Null |

### Unit Test Case 24 (UTC -24)

**findByType(String type):Pka**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | PkaValue |
| Pka1 | 1 | “pka1” | 4 | 2 | 5 |
| Pka2 | 2 | “pka2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | Expect Result | | | | |
| Pka Type | Id | Type | MaxValue | MinValue | PkaValue |
| 1 | Test get pka object by pka type. | “pka1” | 1 | “pka1” | 4 | 2 | 5 |
| 2 | Test get pka object by pka type. | “pka2” | 2 | “pka2” | 7 | 1 | 3 |
| 3 | Test get pka object which is not contain in database. | “pka3” | null |  |  |  |  |
| 4 | Test get pka object which is not contain in database. | “pka4” | null |  |  |  |  |

## PartitionCoefficientServiceimpl Class

### Unit Test Case 25 (UTC -25)

**add(PartitionCoefficient partitionCoefficient): PartitionCoefficient**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | PartitionCoefficientValue |
| PartitionCoefficient1 | 1 | “partitionCoefficient1” | 5 |
| PartitionCoefficient2 | 2 | “partitionCoefficien2” | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | Expect Result | | |
| Id | Type | Value | Id | Type | Value |
| 1 | Test add partitionCoefficient object which is correct the formal of partitionCoefficient object. | null | “partitionCoefficient3” | 2 | Not null | “partitionCoefficient3 ” | 2 |
| 2 | Test add partitionCoefficient object which is correct the formal of partitionCoefficient object. | null | “partitionCoefficient4” | 6 | Not null | “partitionCoefficient4” | 6 |
| 3 | Test add partitionCoefficient object which is contained in the database already. | 1 | “partitionCoefficient1 ” | 5 | Null |  |  |
| 4 | Test add partitionCoefficient object which is contained in the database already. | 2 | “partitionCoefficient2” | 3 | Null |  |  |

### Unit Test Case 26 (UTC -26)

**update(PartitionCoefficient partitionCoefficient): PartitionCoefficient**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | PartitionCoefficientValue |
| PartitionCoefficient1 | 1 | “partitionCoefficient1” | 5 |
| PartitionCoefficient2 | 2 | “partitionCoefficien2” | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | Expect Result | | |
| Id | Type | Value | Id | Type | Value |
| 1 | Test update partitionCoefficient object which is correct the formal of partitionCoefficient object and contained in the database. | 1 | “partitionCoefficient1” | 2 | 1 | “partitionCoefficient” | 2 |
| 2 | Test update partitionCoefficient object which is correct the formal of partitionCoefficient object and contained in the database. | 2 | “partitionCoefficient2” | 6 | 2 | “partitionCoefficient” | 6 |
| 3 | Test update partitionCoefficient object which is not contained in the database. | 3 | “partitionCoefficient3” | 3 | null | Null | Null |
| 4 | Test update partitionCoefficient object which is not contained in the database. | 4 | “partitionCoefficient4” | 5 | null | Null | Null |

### Unit Test Case 27 (UTC -27)

**Delete(PartitionCoefficient partitionCoefficient): PartitionCoefficient**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | PartitionCoefficientValue |
| PartitionCoefficient1 | 1 | “partitionCoefficient1” | 5 |
| PartitionCoefficient2 | 2 | “partitionCoefficien2” | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | Expect Result | | |
| Id | Type | Value | Id | Type | Value |
| 1 | Test delete partitionCoefficient object which is contained in database and correct format partitionCoefficient object. | 1 | “partitionCoefficient1” | 5 | Null | “partitionCoefficient1” | 5 |
| 2 | Test delete partitionCoefficient object which is contained in database and correct format partitionCoefficient object. | 2 | “partitionCoefficient2” | 3 | Null | “partitionCoefficient2” | 3 |
| 3 | Test delete partitionCoefficient object which is not contained in database or incorrect format partitionCoefficient object. | 3 | “partitionCoefficient 3” | 3 | null | Null | Null |
| 3 | Test delete partitionCoefficient object which is not contained in database or incorrect format partitionCoefficient object. | 4 | “partitionCoefficient 4” | 6 | null | Null | Null |

### Unit Test Case 28 (UTC -28)

**findAll():partitionCoefficient []**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | PartitionCoefficientValue |
| PartitionCoefficient1 | 1 | “partitionCoefficient1” | 5 |
| PartitionCoefficient2 | 2 | “partitionCoefficien2” | 3 |

**Test Case**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of pka object |
| 1 | Test get all PartitionCoefficient list | {PartitionCoefficient1, PartitionCoefficient2} |

### Unit Test Case 29 (UTC -29)

**findById(long id): PartitionCoefficient**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | PartitionCoefficientValue |
| PartitionCoefficient1 | 1 | “partitionCoefficient1” | 5 |
| PartitionCoefficient2 | 2 | “partitionCoefficien2” | 3 |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | | |
| Id | Id | Type | Value |
| 1 | Test get partitionCoefficient object by partitionCoefficient id. | 1 | 1 | “partitionCoefficient1” | 5 |
| 2 | Test get partitionCoefficient object by partitionCoefficient id. | 2 | 2 | “partitionCoefficient2” | 3 |
| 3 | Test get partitionCoefficient object which is not contain in database. | 3 | null | Null | Null |
| 4 | Test get partitionCoefficient object which is not contain in database. | 4 | null | Null | Null |

### Unit Test Case 30 (UTC -30)

**findByType(String type):** **PartitionCoefficient**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | PartitionCoefficientValue |
| PartitionCoefficient1 | 1 | “partitionCoefficient1” | 5 |
| PartitionCoefficient2 | 2 | “partitionCoefficien2” | 3 |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Type | Id | Type |
| 1 | Test get partitionCoefficient object by PartitionCoefficient type. | “partitionCoefficient1” | 1 | “partitionCoefficient1” |
| 2 | Test get partitionCoefficient object by partitionCoefficient type. | “partitionCoefficient2” | 2 | “partitionCoefficient2” |
| 3 | Test get partitionCoefficient object which is not contain in database. | “partitionCoefficient3” | null |  |
| 4 | Test get partitionCoefficient object which is not contain in database. | “partitionCoefficient4” | null |  |

## SolidstateServiceimpl Class

### Unit Test Case 31 (UTC -31)

**add(Solidstate solidstate): Solidstate**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Solidsatate1 | 1 | “solidsatate1” |
| Solidsatate2 | 2 | “solidsatate2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test add solidstate  object which is correct the formal of solidsatate object . | null | “solidstate3” | Not null | “solidstate3” |
| 2 | Test add solidstate  object which is correct the formal of Solidsatate object. | null | “solidstate4” | Not Null | “solidstate4” |
| 3 | Test add solidstate object which is contained in the database already. | 1 | “solidstate1” | null |  |
| 4 | Test add solidstate object which is contained in the database already. | 2 | “solidstate2” | null |  |

### Unit Test Case 32 (UTC -32)

**update(Solidstate solidstate): Solidstate**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Solidsatate1 | 1 | “solidsatate1” |
| Solidsatate2 | 2 | “solidsatate2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test update solidstate object which is correct the formal of solidstate object and and contained in the database. | 1 | “solidstateTest1” | 1 | “solidstateTest1” |
| 2 | Test update solidastate object which is correct the formal of solidstate object and and contained in the database. | 2 | “solidstateTest2” | 2 | “solidstateTest2” |
| 3 | Test update solidstate object which is not contained in the database. | 3 | “solidstateTest3” | null |  |
| 3 | Test update solidstate object which is not contained in the database. | 4 | “solidstateTest4” | null |  |

### Unit Test Case 33 (UTC -33)

**Delete(Solidstate solidstate): Solidstate**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Solidsatate1 | 1 | “solidsatate1” |
| Solidsatate2 | 2 | “solidsatate2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test delete solidstate object which is contained in database and correct format solidstate object. | 1 | “solidsatate1” | Null | “solidsatate1” |
| 2 | Test delete solidstate object which is contained in database and correct format solidstate object. | 2 | “solidsatate2”” | Null | “solidsatate2” |
| 3 | Test delete solidstate object which is not contained in database or incorrect format solidstate object. | 3 | “solidsatate3” | null | Null |
| 3 | Test delete solidstate  object which is not contained in database or incorrect format solidstate object. | 4 | “solidsatate4” | null | null |

### Unit Test Case 34 (UTC -34)

**findAll():Solidstate []**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Solidsatate1 | 1 | “solidsatate1” |
| Solidsatate2 | 2 | “solidsatate2” |

**Test Case**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of solidstate object |
| 1 | Test get all solidstate list | {Solidsatate1,Solidstate2} |

### Unit Test Case 35 (UTC -35)

**findById(long id):** **Solidstate**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Solidsatate1 | 1 | “solidsatate1” |
| Solidsatate2 | 2 | “solidsatate2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Id | Id | Type |
| 1 | Test get solidstate object by solidstate id. | 1 | 1 | “solidstate1” |
| 2 | Test get solistate object by solidstate id. | 2 | 2 | “solidstate2” |
| 3 | Test get solidstate object which is not contain in database. | 3 | null | Null |
| 4 | Test get object solidstate which is not contain in database. | 4 | null | Null |

### Unit Test Case 36 (UTC -36)

**findByType(String type):** **Solidstate**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Solidsatate1 | 1 | “solidsatate1” |
| Solidsatate2 | 2 | “solidsatate2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Type | Id | Type |
| 1 | Test get solidstate object by solidstate type. | “solidstate1” | 1 | “solidstate1” |
| 2 | Test get solidstate object by solidstate type. | “solidstate2” | 2 | “solidstate2” |
| 3 | Test get solidstate object which is not contain in database. | “solidstate3” | null |  |
| 4 | Test get object solidstate which is not contain in database. | “solidstate4” | null |  |

## HygroscopicityServiceimpl Class

### Unit Test Case 37 (UTC -37)

**add(Hygroscopicity hygroscopicity): Hygroscopicity**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Hygroscopicity1 | 1 | “hygroscopicity1” |
| Hygroscopicity2 | 2 | “hygroscopicity2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test add hygroscopicity object which is correct the formal of hygroscopicity object. | null | “hygroscopicity3” | Not Null | “hygroscopicity3” |
| 2 | Test add hygroscopicity object which is correct the formal of hygroscopicity object. | null | “hygroscopicity4” | Not Null | “hygroscopicity4” |
| 3 | Test add hygroscopicity object which is contained in the database already. | 1 | “hygroscopicity1” | Null | Null |
| 4 | Test add hygroscopicity object which is contained in the database already. | 2 | “hygroscopicity1” | Null | Null |

### Unit Test Case 38 (UTC -38)

**update (Hygroscopicity hygroscopicity): Hygroscopicity**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Hygroscopicity1 | 1 | “hygroscopicity1” |
| Hygroscopicity2 | 2 | “hygroscopicity2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test update hygroscopicity object which is correct the formal of hygroscopicity  object and contained in the database. | 1 | “hygroscopicity1” | 1 | “hygroscopicity1” |
| 2 | Test update hygroscopicity object which is contained in database and correct format hygroscopicity object. | 2 | “hygroscopicity2” | 2 | “hygroscopicity2” |
| 3 | Test update hygroscopicity object which is not contained in database or incorrect format hygroscopicity object. | 3 | “hygroscopicity3” | Null | Null |
| 4 | Test update hygroscopicity object which is not contained in database or incorrect format. | 4 | “hygroscopicity4” | Null | Null |

### Unit Test Case 39(UTC -39)

**Delete(Hygroscopicity hygroscopicity): Hygroscopicity**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Hygroscopicity1 | 1 | “hygroscopicity1” |
| Hygroscopicity2 | 2 | “hygroscopicity2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test delete hygroscopicity object which is contained in database and correct format hygroscopicity object. | 1 | “hygroscopicity1” | Null | “hygroscopicity1” |
| 2 | Test delete hygroscopicity object which is contained in database and correct format hygroscopicity object. | 2 | “hygroscopicity2” | Null | “hygroscopicity2” |
| 3 | Test delete hygroscopicity object which is not contained in database or incorrect format hygroscopicity object. | 3 | “hygroscopicity3” | Null | Null |
| 4 | Test delete hygroscopicity object which is not contained in database or incorrect format. | 4 | “hygroscopicity4” | Null | Null |

### Unit Test Case 40 (UTC -40)

**findAll():Hygroscopicity []**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Hygroscopicity1 | 1 | “hygroscopicity1” |
| Hygroscopicity2 | 2 | “hygroscopicity2” |

**Test Case**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of hygroscopicity object |
| 1 | Test get all hygroscopicity list | { Hygroscopicity1, Hygroscopicity2} |

### Unit Test Case 41 (UTC -41)

**findById(long id):** **Hygroscopicity**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Hygroscopicity1 | 1 | “hygroscopicity1” |
| Hygroscopicity2 | 2 | “hygroscopicity2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Id | Id | Type |
| 1 | Test get hygroscopicity object by hygroscopicity id. | 1 | 1 | “hygroscopicity1” |
| 2 | Test get hygroscopicity object by hygroscopicity id. | 2 | 2 | “hygroscopicity2” |
| 3 | Test get hygroscopicity object which is not contain in database. | 3 | null | Null |
| 4 | Test get object hygroscopicity which is not contain in database. | 4 | null | Null |

### Unit Test Case 42 (UTC -42)

**findByType(String type):** **Hygroscopicity**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Hygroscopicity1 | 1 | “hygroscopicity1” |
| Hygroscopicity2 | 2 | “hygroscopicity2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Type | Id | Type |
| 1 | Test get hygroscopicity object by hygroscopicity type. | “hygroscopicity1” | 1 | “hygroscopicity1” |
| 2 | Test get hygroscopicity object by hygroscopicity type. | “hygroscopicity2” | 2 | “hygroscopicity2” |
| 3 | Test get hygroscopicity object which is not contain in database. | “hygroscopicity3” | null |  |
| 4 | Test get hygroscopicity object which is not contain in database. | “hygroscopicity4” | null |  |

## ParticleSizeServiceImpl Class

### Unit Test Case 43 (UTC -43)

**add(ParticleSize particle Size): Particle Size**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | particleSizeValue |
| ParticleSize1 | 1 | “particleSize 1” | 4 | 2 | 5 |
| ParticleSize 2 | 2 | “particleSize 2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | | Expect Result | | | | |
| Id | Type | MaxValue | MinValue | particleSize Value | Id | Type | MaxValue | MinValue | particleSize Value |
| 1 | Test add particleSize object which is correct the formal of particleSize object. | null | “particleSize 3” | 4 | 4 | 2 | Not null | “particleSize 3” | 4 | 4 | 2 |
| 2 | Test add particleSize object which is correct the formal of particleSize object. | null | “particleSize 4” | 6 | 3 | 6 | Not null | “particleSize 4” | 6 | 3 | 6 |
| 3 | Test add particleSize object which is contained in the database already. | 1 | “particleSize 1” | 4 | 2 | 5 | null | null | null | null | Null |
| 4 | Test add particleSize object which is contained in the database already. | 2 | “particleSize 2” | 7 | 1 | 3 | null | null | null | null | null |

### Unit Test Case 44 (UTC -44)

**update(ParticleSize particle Size): Particle Size**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | particleSizeValue |
| ParticleSize1 | 1 | “particleSize 1” | 4 | 2 | 5 |
| ParticleSize 2 | 2 | “particleSize 2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | | Expect Result | | | | |
| Id | Type | MaxValue | MinValue | particleSize Value | Id | Type | MaxValue | MinValue | particleSize Value |
| 1 | Test update particleSize object which is correct the formal of particleSize object and and contained in the database. | 1 | “particleSize 1” | 6 | 4 | 3 | 1 | “particleSize 1” | 6 | 4 | 3 |
| 2 | Test update particleSize object which is correct the formal of particleSize object and and contained in the database. | 2 | “particleSize 2” | 7 | 3 | 10 | 2 | “particleSize 2” | 7 | 3 | 10 |
| 3 | Test update particleSize object which is not contained in the database. | 3 | “particleSize3” | 2 | 1 | 3 | null | null | null | null | null |
| 4 | Test update particleSize object which is not contained in the database. | 4 | “particleSize 4” | 3 | 2 | 5 | null | null | null | null | null |

### Unit Test Case 45 (UTC -45)

**delete(ParticleSize particle Size): Particle Size**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | particleSizeValue |
| ParticleSize1 | 1 | “particleSize 1” | 4 | 2 | 5 |
| ParticleSize2 | 2 | “particleSize 2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | | Expect Result | | | | |
| Id | Type | MaxValue | MinValue | particleSize Value | Id | Type | MaxValue | MinValue | particleSize Value |
| 1 | Test delete particleSize object which is contained in database and correct format particleSize object. | 1 | “particleSize 1” | 4 | 2 | 5 | Null | “particleSize” | 4 | 2 | 5 |
| 2 | Test delete particleSize object which is contained in database and correct format particleSize object. | 2 | “particleSize 2” | 7 | 3 | 10 | null | “particleSize” | 7 | 1 | 3 |
| 3 | Test delete particleSize object which is not contained in database or incorrect format particleSize object. | 3 | “particleSize 3” | 4 | 1 | 3 | null | null | null | null | Null |
| 4 | Test delete particleSize object which is not contained in database or incorrect format solubility object. | 4 | “particleSize 4” | 3 | 2 | 6 | null | null | null | null | null |

### Unit Test Case 46 (UTC -46)

**findAll():ParticleSize []**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | particleSizeValue |
| ParticleSize1 | 1 | “particleSize 1” | 4 | 2 | 5 |
| ParticleSize2 | 2 | “particleSize 2” | 7 | 1 | 3 |

**Test Plan**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of particleSize |
| 1 | Test get all particleSize list | {ParticleSize1,ParticleSize2} |

### Unit Test Case 47 (UTC -47)

**findById(long id):ParticleSize**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | particleSizeValue |
| ParticleSize1 | 1 | “particleSize 1” | 4 | 2 | 5 |
| ParticleSize2 | 2 | “particleSize 2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | Expect Result | | | | |
| Id | Id | Type | MaxValue | MinValue | particleSize Value |
| 1 | Test get particleSize object which is contained in database by particleSize id. | 1 | 1 | “particleSize 1” | 4 | 2 | 5 |
| 2 | Test get particleSize object which is contained in database by solubility id. | 2 | 2 | “particleSize 2” | 7 | 1 | 3 |
| 3 | Test get particleSize object which is not contain in database by solubility id. | 3 | null | Null | Null | Null | Null |
| 4 | Test get particleSize object which is not contain by particleSize id in database. | 4 | null | Null | Null | Null | Null |

### Unit Test Case 48 (UTC -48)

**findByType(String type):ParticleSize**

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | particleSize Value |
| ParticleSize1 | 1 | “particleSize 1” | 4 | 2 | 5 |
| ParticleSize2 | 2 | “particleSize 2” | 7 | 1 | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | Expect Result | | | | |
| particleSize Type | Id | Type | MaxValue | MinValue | particleSize Value |
| 1 | Test get particleSize object which is contained in the database by particleSize type. | “particleSize1” | 1 | “particleSize1” | 4 | 2 | 5 |
| 2 | Test get particleSize object which is contained in the database by solubility type. | “particleSize2” | 2 | “particleSize2” | 7 | 1 | 3 |
| 3 | Test get particleSize object which is not contain in database by particleSize type. | “particleSize3” | Null | Null | Null | Null | Null |
| 4 | Test get particleSize object which is not contain in database by particleSize type. | “particleSize4” | Null | Null | Null | Null | Null |

## FlowabilityServiceimpl Class

### Unit Test Case 49 (UTC -49)

**add(Flowability flowability): Flowability**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Flowability1 | 1 | “flowability1” |
| Flowability2 | 2 | “flowability2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test add Flowability object which is correct the formal of Flowability object. | null | “Flowability3” | Not Null | “Flowability3” |
| 2 | Test add Flowability object which is correct the formal of Flowability object. | null | “Flowability4” | Not Null | “Flowability4” |
| 3 | Test add Flowability object which is contained in the database already. | 1 | “Flowability1” | Null | Null |
| 4 | Test add Flowability object which is contained in the database already. | 2 | “Flowability2” | Null | Null |

### Unit Test Case 50 (UTC -50)

**update (Flowability flowability): Flowability**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Flowability1 | 1 | “flowability1” |
| Flowability2 | 2 | “flowability2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test update flowability object which is correct the formal of flowability  object and contained in the database. | 1 | “flowability1” | 1 | “flowability1” |
| 2 | Test update flowability object which is contained in database and correct format flowability object. | 2 | “flowability2” | 2 | “flowability2” |
| 3 | Test update flowability object which is not contained in database or incorrect format flowability object. | 3 | “flowability3” | Null | Null |
| 4 | Test update flowability object which is not contained in database or incorrect format. | 4 | “flowability4” | Null | Null |

### Unit Test Case 51(UTC -51)

**Delete(Flowability flowability): Flowability**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Flowability1 | 1 | “flowability1” |
| Flowability2 | 2 | “flowability2” |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | Expect Result | |
| Id | Type | Id | Type |
| 1 | Test delete flowability object which is contained in database and correct format flowability object. | 1 | “flowability1” | Null | “flowability1” |
| 2 | Test delete flowability object which is contained in database and correct format flowability object. | 2 | “flowability2” | Null | “flowability2” |
| 3 | Test delete flowability object which is not contained in database or incorrect format flowability object. | 3 | “flowability3” | Null | Null |
| 4 | Test delete flowability object which is not contained in database or incorrect format. | 4 | “flowability4” | Null | Null |

### Unit Test Case 52 (UTC -52)

**findAll():Flowability[]**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Flowability1 | 1 | “flowability1” |
| Flowability2 | 2 | “flowability2” |

**Test Case**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of flowability object |
| 1 | Test get all flowability list | { Flowability 1, Flowability 2} |

### Unit Test Case 53 (UTC -53)

**findById(long id): Flowability**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Flowability1 | 1 | “flowability1” |
| Flowability2 | 2 | “flowability2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Id | Id | Type |
| 1 | Test get flowability object by flowability id. | 1 | 1 | “flowability1” |
| 2 | Test get flowability object by flowability id. | 2 | 2 | “flowability2” |
| 3 | Test get flowability object which is not contain in database. | 3 | null | Null |
| 4 | Test get object flowability which is not contain in database. | 4 | null | Null |

### Unit Test Case 54 (UTC -54)

**findByType(String type): Flowability**

**Test data**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Flowability1 | 1 | “Flowability1” |
| Flowability 2 | 2 | “Flowability 2” |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Type | Id | Type |
| 1 | Test get flowability object by flowability type. | “flowability1” | 1 | “flowability1” |
| 2 | Test get flowability object by flowability type. | “flowability2” | 2 | “flowability2” |
| 3 | Test get flowability object which is not contain in database. | “flowability3” | null |  |
| 4 | Test get flowability object which is not contain in database. | “flowability4” | null |  |

## DensityServiceimpl Class

### Unit Test Case 55 (UTC -55)

**add(Density density): Density**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | DensityValue |
| Density1 | 1 | “density1” | 5 |
| Densityt2 | 2 | “density2” | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | Expect Result | | |
| Id | Type | Value | Id | Type | Value |
| 1 | Test add density object which is correct the formal of density object. | null | “density3” | 2 | Not null | “density3 ” | 2 |
| 2 | Test add density object which is correct the formal of density object. | null | “density4” | 6 | Not null | “density4” | 6 |
| 3 | Test add density object which is contained in the database already. | 1 | “density1 ” | 5 | Null |  |  |
| 4 | Test add density object which is contained in the database already. | 2 | “density2” | 3 | Null |  |  |

### Unit Test Case 56 (UTC -56)

**update(Density density): Density**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | PartitionCoefficientValue |
| density1 | 1 | “density1” | 5 |
| density2 | 2 | “density2” | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | Expect Result | | |
| Id | Type | Value | Id | Type | Value |
| 1 | Test update density object which is correct the formal of density object and contained in the database. | 1 | “density1” | 2 | 1 | “density” | 2 |
| 2 | Test update density object which is correct the formal of density object and contained in the database. | 2 | “density2” | 6 | 2 | “density” | 6 |
| 3 | Test update density object which is not contained in the database. | 3 | “density3” | 3 | null | Null | Null |
| 4 | Test update density object which is not contained in the database. | 4 | “density 4” | 5 | null | Null | Null |

### Unit Test Case 57 (UTC -57)

**Delete(Density density): Density Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | DensityValue |
| density1 | 1 | “density1” | 5 |
| density2 | 2 | “density2” | 3 |

**Test Case**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | Expect Result | | |
| Id | Type | Value | Id | Type | Value |
| 1 | Test delete density object which is contained in database and correct format density object. | 1 | “density1” | 5 | Null | “density1” | 5 |
| 2 | Test delete density object which is contained in database and correct format density object. | 2 | “density2” | 3 | Null | “density2” | 3 |
| 3 | Test delete density object which is not contained in database or incorrect format solubility object. | 3 | “density3” | 3 | null | Null | Null |
| 3 | Test delete density object which is not contained in database or incorrect format solubility object. | 4 | “density4” | 6 | null | Null | Null |

### Unit Test Case 58 (UTC -58)

**findAll():Density []**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | Density Value |
| density1 | 1 | “density1” | 5 |
| density2 | 2 | “density2” | 3 |

**Test Case**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of Density object |
| 1 | Test get all Density list | {Density1, Density2} |

### Unit Test Case 59 (UTC -59)

**findById(long id): Density**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | Density Value |
| density1 | 1 | “density1” | 5 |
| density2 | 2 | “density2” | 3 |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | | |
| Id | Id | Type | Value |
| 1 | Test get density object by density id. | 1 | 1 | “density1” | 5 |
| 2 | Test get density object by density id. | 2 | 2 | “density2” | 3 |
| 3 | Test get density object which is not contain in database. | 3 | null | Null | Null |
| 4 | Test get density object which is not contain in database. | 4 | null | Null | Null |

### Unit Test Case 60 (UTC -60)

**findByType(String type):** **Density**

**Test data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | PartitionCoefficientValue |
| density1 | 1 | “density1” | 5 |
| density2 | 2 | “density2” | 3 |

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | |
| Type | Id | Type |
| 1 | Test get density object by density type. | “density1” | 1 | “density1” |
| 2 | Test get density object by density type. | “density2” | 2 | “density2” |
| 3 | Test get density object which is not contain in database. | “density3” | null |  |
| 4 | Test get density object which is not contain in database. | “density4” | null |  |

## CompoundFunction Class

### Unit Test Case 61 (UTC -61)

**add(CompoundFunction compoundFunction): CompoundFunction**

**Test data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | Expect Result | | | |
| Id | Type | MaxValue | MinValue | Id | Type | MaxValue | MinValue |
| 1 | Test add compoundFunctionobject which is correct the formal of compoundFunction object. | null | “compoundFunction3” | 4 | 4 | Not null | “compoundFunction3” | 4 | 4 |
| 2 | Test add compoundFunction object which is correct the formal of compoundFunction object. | null | “compoundFunction4” | 6 | 3 | Not null | “compoundFunction4” | 6 | 3 |
| 3 | Test add compoundFunction object which is contained in the database already. | 1 | “compoundFunction1” | 4 | 2 | null | null | null | null |
| 4 | Test add compoundFunction object which is contained in the database already. | 2 | “compoundFunction2” | 7 | 1 | null | null | null | null |

### Unit Test Case 62 (UTC -62)

**Update (CompoundFunction compoundFunction): CompoundFunction**

**Test data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | Expect Result | | | |
| Id | Type | MaxValue | MinValue | Id | Type | MaxValue | MinValue |
| 1 | Test update compoundFunction object which is correct the formal of compoundFunction object and exit in database. | 1 | “compoundFunction1” | 6 | 4 | 1 | “compoundFunction1” | 6 | 4 |
| 2 | Test update compoundFunction object which is correct the formal of compoundFunction object and exit in database. | 2 | “compoundFunction2” | 7 | 3 | 2 | “compoundFunction2” | 7 | 3 |
| 3 | Test update compoundFunction object which is not contained in the database. | 3 | “compoundFunction3” | 2 | 1 | null | null | null | null |
| 4 | Test update solubility object which is not contained in the database. | 4 | “compoundFunction4” | 3 | 2 | null | null | null | null |

### Unit Test Case 63 (UTC -63)

**delete(CompoundFunction compoundFunction): CompoundFunction**

**Test data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | | | | Expect Result | | | |
| Id | Type | MaxValue | MinValue | Id | Type | MaxValue | MinValue |
| 1 | Test delete compoundFunction object which is contained in database and correct format compoundFunction object. | 1 | “compoundFunction1” | 4 | 2 | Null | “compoundFunction1” | 4 | 2 |
| 2 | Test delete compoundFunction object which is contained in database and correct format compoundFunction object. | 2 | “compoundFunction2” | 7 | 1 | Null | “compoundFunction2” | 7 | 1 |
| 3 | Test delete compoundFunction object which is not contained in database or incorrect format compoundFunction object. | 3 | “compoundFunction3” | 4 | 1 | Null | Null | null | null |
| 4 | Test delete compoundFunction object which is not contained in database or incorrect format compoundFunction object. | 4 | “compoundFunction4” | 3 | 2 | Null | Null | null | null |

### Unit Test Case 64 (UTC -64)

**findAll():CompoundFunction[]**

**Test data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |

**Test Plan**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of compoundFunction object |
| 1 | Test get all CompoundFunction list | { CompoundFunction1, CompoundFunction1} |

### Unit Test Case 65 (UTC -65)

**findById(long id):CompoundFunction**

**Test data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |

**Test Case**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | Expect Result | | | |
| Id | Id | Type | MaxValue | MinValue |
| 1 | Test get compoundFunction object which is contained in the database by compoundFunction id . | 1 | 1 | “compoundFunction1” | 4 | 2 |
| 2 | Test get compoundFunction object which is contained in the database by compoundFunction id. | 2 | 2 | “CompoundFunction2” | 7 | 1 |
| 3 | Test get compoundFunction object which is not contain in database by compoundFunction id. | 3 | null | Null | Null | Null |
| 4 | Test get compoundFunction object which is not contain in database by compoundFunction id. | 4 | null | Null | Null | Null |

### Unit Test Case 66 (UTC -66)

**findByType(String type):CompoundFunction**

**Test data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |

**Test Case**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Case No. | Description | Input data | Expect Result | | | |
| Type | Id | Type | MaxValue | MinValue |
| 1 | Test get compoundFunction object which is contained in the database by compoundFunction type. | 1 | 1 | “compoundFunction1” | 4 | 2 |
| 2 | Test get compoundFunction object which is contained in the database by compoundFunction type. | 2 | 2 | “CompoundFunction2” | 7 | 1 |
| 3 | Test get compoundFunction object which is not contain in database by compoundFunction type. | 3 | null | Null | Null | Null |
| 4 | Test get compoundFunction object which is not contain in database by compoundFunction type. | 4 | null | Null | Null | Null |

## SubstanceServiceImpl Class

**Test data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | SolubilityValue |
| Solubility1 | 1 | “solubility1” | 4 | 2 | 5 |
| Solubility2 | 2 | “solubility2” | 5 | 3 | 2 |

**WaterSolubility**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| DegradationMechinism1 | 1 | “degradationMechinism1” |
| DegradationMechinish2 | 2 | “degradationMechinism2” |
| DegradationMechinish3 | 3 | “degradationMechinish3” |
| DegradationMechinish4 | 4 | “degradationMechinish4” |

**DegradationMechinism**

**KineticReaction**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| KineticReaction1 | 1 | “kineticReaction1” |
| KineticReaction2 | 2 | “kineticReaction2” |

**Stability**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | id | degradationMechanism List | KineticReaction object |
| Stability1 | 1 | { DegradationMechinism1, DegradationMechinism2} | KineticReaction1 |
| Stability2 | 2 | { DegradationMechinism3, DegradationMechinism4} | KineticReaction2 |

**DissolutionProperty**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | PkaValue |
| Pka1 | 1 | “pka1” | 4 | 2 | 5 |
| Pka2 | 2 | “pka2” | 7 | 1 | 3 |

**PartitionCoefficient**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | PartitionCoefficientValue |
| PartitionCoefficient1 | 1 | “partitionCoefficient1” | 5 |
| PartitionCoefficient1 | 2 | “partitionCoefficien2” | 3 |

**Solidstate**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Solidstate1 | 1 | “solidstate1” |
| Solidstate2 | 2 | “solidstate2” |

**Hygroscopicity**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | ParticleSizeValue |
| ParticleSize1 | 1 | “particleSize1” | 4 | 2 | 5 |
| ParticleSize 2 | 2 | “particleSize2” | 7 | 1 | 3 |

**ParticleSize**

**AlcoholSolubility**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue | SolubilityValue |
| Solubility3 | 3 | “solubility3” | 2 | 1 | 4 |
| Solubility4 | 4 | “solubility4” | 6 | 3 | 5 |

**Flowability**

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Flowability1 | 1 | “flowability1” |
| Flowability2 | 2 | “flowability2” |

|  |  |  |
| --- | --- | --- |
| Object Name | ID | Type |
| Hygroscopicity1 | 1 | “hygroscopicity1” |
| Hygroscopicity2 | 2 | “hygroscopicity2” |

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Type | Density Value |
| Density 1 | 1 | “density 1” | 5 |
| Density 1 | 2 | “density 2” | 3 |

**Density**

**SaltForm**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | Weight | Pka Object |
| SaltForm1 | 1 | 4 | Pka1 |
| SaltForm2 | 2 | 3 | Pka2 |

Substance = Substance(long id, String name, Solubility watersolubilityproperty, PartitionCoefficient partitioncoefficientproperty, Flowability flowabilityproperty, Density powderdensityproperty, SaltForm saltproperty, Solubility alcoholsolubilityproperty, ParticleSize particleproperty, Hygroscopicity hygroscopicityproperty, Solidstate physicalformproperty, Pka dissolutionproperty, Stability stabilityproperty, float weightproperty ,String lonicity)

Substance1= {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”}

Substance2= {1,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”}

\*Test data is used for every test case in substance class\*

### Unit Test Case 67 (UTC -67)

**add (Substance substance): Substance**

**Test Case**

|  |  |  |  |
| --- | --- | --- | --- |
| case | Description | Input | Expect Result |
| Substance object | Substance object |
| 1 | Test add Substance object which is correct the formal of Substance object | {null,”substance3”,Solubility3,PartitionCoefficient3, Flowability3, Density3,SaltForm3,Solublity3,ParticleSize3,Hygroscopicity3,Solidstate3,Pka3,Stability,3,india”} | {not null,”substance3”,Solubility3,PartitionCoefficient3, Flowability3, Density3,SaltForm3,Solublity3,ParticleSize3,Hygroscopicity3,Solidstate3,Pka3,Stability,3,”india”} |
| 2 | Test add  Substance object which is correct the formal of Substance object | {null,”substance4”,Solubility4,PartitionCoefficient4, Flowability4, Density4,SaltForm4,Solublity4,ParticleSize4,Hygroscopicity4,Solidstate4,Pka4,Stability,4,”korea”} | {not null,”substance4”,Solubility4,PartitionCoefficient4, Flowability4, Density4,SaltForm4,Solublity4,ParticleSize4,Hygroscopicity4,Solidstate4,Pka4,Stability,4,”korea”} |
| 3 | Test add Substance object which is contained in the database already | {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”} | null |
| 4 | Test add Substance object which is contained in the database already | {2,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”} | null |

### Unit Test Case 68 (UTC -68)

**update(Substance substance): Substance**

**Test Case**

|  |  |  |  |
| --- | --- | --- | --- |
| case | Description | Input | Expect Result |
| Substance object | Substance object |
| 1 | Test update substance object which is correct the formal of substance object and exit in database | {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”} | {1,”substance1”,Solubility,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”} |
| 2 | Test update substance object which is correct the formal of substance object and exit in database | {2,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”} | {2,”substance2”,Solubility,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”} |
| 3 | Test update substance object which is not contained in the database | {3,”substance3”,Solubility3,PartitionCoefficient3, Flowability3, Density3,SaltForm3,Solublity3,ParticleSize3,Hygroscopicity3,Solidstate3,Pka3,Stability,3,india”} | null |
| 4 | Test update substance object which is not contained in the database | {4,”substance4”,Solubility4,PartitionCoefficient4, Flowability4, Density4,SaltForm4,Solublity4,ParticleSize4,Hygroscopicity4,Solidstate4,Pka4,Stability,4,”korea”} | null |

### Unit Test Case 69 (UTC -69)

**delete(Substance substance): Substance**

**Test Case**

|  |  |  |  |
| --- | --- | --- | --- |
| case | Description | Input | Expect Result |
| Substance object | Substance object |
| 1 | Test delete substance object which is contained in database and correct format particleSize1object | {1,”substance1”,Solubility,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”} | {null,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”} |
| 2 | Test delete substance object which is contained in database and correct format particleSize1object | {2,”substance2”,Solubility,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”} | {null,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”} |
| 3 | Test delete substance object which is not contained in database or incorrect format substance object | {3,”substance3”,Solubility3,PartitionCoefficient3, Flowability3, Density3,SaltForm3,Solublity3,ParticleSize3,Hygroscopicity3,Solidstate3,Pka3,Stability,3,india”} | null |
| 4 | Test delete particleSize object which is not contained in database or incorrect format particleSize object | {4,”substance4”,Solubility4,PartitionCoefficient4, Flowability4, Density4,SaltForm4,Solublity4,ParticleSize4,Hygroscopicity4,Solidstate4,Pka4,Stability,4,”korea”} | null |

### Unit Test Case 70 (UTC -70)

**findAll():Substance []**

**Test Case**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of Substance |
| 1 | Test get all substance list | { Substance1, Substance 2} |

### Unit Test Case 71 (UTC -71)

**findById(long id): Substance**

**Test Case**

|  |  |  |  |
| --- | --- | --- | --- |
| case | Description | Input | Expect result |
| id | Substance object |
| 1 | Test get substance object by substance id | 1 | {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”} |
| 2 | Test get substance object by substance id | 2 | {2,”substance2”,Solubility,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”} |
| 3 | Test get substance object which is not contain in database | 3 | null |
| 4 | Test get substance object which is not contain in database | 4 | null |

### Unit Test Case 72 (UTC -72)

**findByName(String name): Substance**

**Test Case**

|  |  |  |  |
| --- | --- | --- | --- |
| case | Description | Input | Expect result |
| name | Substance object |
| 1 | Test get substance object by substance name | “substance1” | {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”} |
| 2 | Test get substance object by substance name | “substance2” | {2,”substance2”,Solubility1,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”} |
| 3 | Test get substance object which is not contain in database | “substance3” | null |
| 4 | Test get substance object which is not contain in database | “substance4” | null |

## ExcipientServiceImpl Class

### Unit Test Case 73 (UTC -73)

**addExcipient (Excipient excipient):excipient**

**Test data**

**CompoundFunction**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 2 |

**Excipient**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | Description | Input | | | | Expect Result | | | |
| ID | Quantity | CompoundFunction list | Substance | ID | Quantity | CompoundFunction list | Substance |
| 1 | Test add Excipient object which is correct the formal of Excipient object | null | 4 | { CompoundFunction1, CompoundFunction2} | Substance1 | Not null | 4 | { CompoundFunction1, CompoundFunction2} | Substan1 |
| 2 | Test add  Excipient object which is correct the formal of Excipient object | null | 5 | {CompoundFunction1, CompoundFunction2} | Substance1 | Not null | 8 | {CompoundFunction1, CompoundFunction2} | Substan2 |
| 3 | Test add Excipient object which is contained in the database already | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 | null | null | null | null |
| 4 | Test add Excipient object which is contained in the database already | 2 | 2 | {CompoundFunction1, CompoundFunction2} | Substance2 | null | null | null | null |

### Unit Test Case 74 (UTC -74)

**updateExcipient (Excipient excipient):excipient**

**Test data**

**CompoundFunction**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 2 |

**Excipient**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | Description | Input | | | | Expect Result | | | |
| ID | Quantity | CompoundFunction list | Substance | ID | Quantity | CompoundFunction list | Substance |
| 1 | Test update excipient object which is correct the formal of excipient object and exit in database | 1 | 3 | { CompoundFunction1, CompoundFunction2} | Substance1 | 1 | 3 | { CompoundFunction1, CompoundFunction2} | Substance1 |
| 2 | Test update excipient object which is correct the formal of excipient object and exit in database | 2 | 5 | {CompoundFunction3, CompoundFunction4} | Substance2 | 2 | 5 | {CompoundFunction3, CompoundFunction4} | Substance2 |
| 3 | Test update excipient object which is not contained in the database | 3 | 3 | 2 | 1 | null | null | null | null |
| 4 | Test update excipient object which is not contained in the database | 4 | 14 | 3 | 2 | null | null | null | null |

### Unit Test Case 75 (UTC -75)

**deleteExcipient (Excipient excipient):excipient**

**Test data**

**CompoundFunction**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 2 |

**Excipient**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |

**Test Case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | Description | Input | | | | Expect Result | | | |
| ID | Quantity | CompoundFunction list | Substance | ID | Quantity | CompoundFunction list | Substance |
| 1 | Test delete excipient object which is contained in database and correct format excipient object | 1 | 3 | { CompoundFunction1, CompoundFunction2} | Substance1 | null | 3 | { CompoundFunction1, CompoundFunction2} | Substance1 |
| 2 | Test update excipient object which is correct the formal of excipient object and exit in database | 2 | 5 | {CompoundFunction3, CompoundFunction4} | Substance2 | null | 5 | {CompoundFunction3, CompoundFunction4} | Substance2 |
| 3 | Test update excipient object which is not contained in the database | 3 | 3 | 2 | 1 | null | null | null | null |
| 4 | Test update excipient object which is not contained in the database | 4 | 14 | 3 | 2 | null | null | null | null |

### Unit Test Case 76 (UTC -76)

**findAll():Excipient []**

**Test data**

**CompoundFunction**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 2 |

**Excipient**

**Test Case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of Excipient |
| 1 | Test get all excipient list | {excipient1,excipient2} |

### Unit Test Case 77 (UTC -77)

**findById(long id): Excipient**

**Test data**

**CompoundFunction**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 2 |

**Excipient**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |

**Test Case**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| case | Description | Input | Expect Result | | | |
| Id | Id | Quantity | CompoundFunction list | Substance |
| 1 | Test get excipient object by excipient id | 1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Substance1 |
| 2 | Test get excipient object by excipient id | 2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Substance2 |
| 3 | Test get excipient object which is not contain in database | 3 | null | | | |
| 3 | Test get excipient object which is not contain in database | 4 | null | | | |

## TabletFormulationServiceImpl Class

### Unit Test Case 78 (UTC -78)

**addTabletFormulation (TabletFormulation tabletFormulation): TabletFormulation**

**Test data**

**Compound Function data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 3 |
| CompoundFunction5 | 5 | “compoundFunction5” | 5 | 1 |
| CompoundFunction6 | 6 | “compoundFunction6” | 3 | 2 |
| CompoundFunction7 | 7 | “compoundFunction7” | 9 | 2 |
| CompoundFunction8 | 8 | “compoundFunction8” | 4 | 1 |

**Substance data**

Substance1= {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”}

Substance2= {1,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance object |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |
| Excipient3 | 3 | 5 | {CompoundFunction5, CompoundFunction6} | Subtance1 |
| Excipient4 | 4 | 7 | {CompoundFunction7, CompoundFunction8} | Subtance2 |

**Excipient data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | name | excipient list |
| TabletFormulation1 | 1 | “tabletFormulation1” | { Excipient1, Excipient2} |
| TabletFormulation2 | 2 | “tabletFormulation2” | { Excipient3, Excipient4} |

**Tablet Formulation**

**Test Case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | Description | Input | | | | Expect Result | | | |
| ID | name | Quantity | excipient list  Substance | ID | name | Quantity | excipient list |
| 1 | Test add tabletFormulation object which is correct the formal of tabletFormulation object | null | “tabletFormulation3” | 4 | { Excipient 1, Excipient 2} | Not null | “tabletFormulation3” | 4 | { Excipient 1, Excipient 2} |
| 2 | Test add  tabletFormulation object which is correct the formal of tabletFormulation object | null | “tabletFormulation4” | 5 | { Excipient 1, Excipient 2} | Not null | “tabletFormulation4” | 8 | { Excipient 1, Excipient 2} |
| 3 | Test add tabletFormulation object which is contained in the database already | 1 | “tabletFormulation1” | 1 | { Excipient1, Excipient 2} | null | null | null | null |
| 4 | Test add tabletFormulation object which is contained in the database already | 2 | “tabletFormulation2” | 2 | { Excipient1, Excipient 2} | null | null | nukl | null |

### Unit Test Case 79 (UTC -79)

**updateTabletFormulation (TabletFormulation tabletFormulation): TabletFormulation**

**Test data**

**Compound Function data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 3 |
| CompoundFunction5 | 5 | “compoundFunction5” | 5 | 1 |
| CompoundFunction6 | 6 | “compoundFunction6” | 3 | 2 |
| CompoundFunction7 | 7 | “compoundFunction7” | 9 | 2 |
| CompoundFunction8 | 8 | “compoundFunction8” | 4 | 1 |

**Substance data**

Substance1= {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”}

Substance2= {1,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance object |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |
| Excipient3 | 3 | 5 | {CompoundFunction5, CompoundFunction6} | Subtance1 |
| Excipient4 | 4 | 7 | {CompoundFunction7, CompoundFunction8} | Subtance2 |

**Excipient data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | name | excipient list |
| TabletFormulation1 | 1 | “tabletFormulation1” | { Excipient1, Excipient2} |
| TabletFormulation2 | 2 | “tabletFormulation2” | { Excipient3, Excipient4} |

**Tablet Formulation**

**Test Case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | Description | Input | | | | Expect Result | | | |
| ID | name | Quantity | excipient list  Substance | ID | name | Quantity | excipient list |
| 1 | Test update tabletFormulation object which is correct the formal of tabletFormulation object | 1 | “tabletFormulation1” | 7 | { Excipient 3, Excipient 2} | 1 | “tabletFormulation3” | 7 | { Excipient 3, Excipient 2} |
| 2 | Test update  tabletFormulation object which is correct the formal of tabletFormulation object | 2 | “tabletFormulation2” | 2 | { Excipient 1, Excipient 4} | 2 | “tabletFormulation4” | 2 | { Excipient 1, Excipient 4} |
| 3 | Test update tabletFormulation object which is contained in the database already | 3 | “tabletFormulation1” | 1 | { Excipient1, Excipient 2} | null | null | null | null |
| 4 | Test update tabletFormulation object which is contained in the database already | 4 | “tabletFormulation2” | 2 | { Excipient1, Excipient 2} | null | null | nukl | null |

### Unit Test Case 80 (UTC -80)

**deleteTabletFormulation (TabletFormulation tabletFormulation): TabletFormulation**

**Test data**

**Compound Function data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 3 |
| CompoundFunction5 | 5 | “compoundFunction5” | 5 | 1 |
| CompoundFunction6 | 6 | “compoundFunction6” | 3 | 2 |
| CompoundFunction7 | 7 | “compoundFunction7” | 9 | 2 |
| CompoundFunction8 | 8 | “compoundFunction8” | 4 | 1 |

**Substance data**

Substance1= {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”}

Substance2= {1,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance object |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |
| Excipient3 | 3 | 5 | {CompoundFunction5, CompoundFunction6} | Subtance1 |
| Excipient4 | 4 | 7 | {CompoundFunction7, CompoundFunction8} | Subtance2 |

**Excipient data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | name | excipient list |
| TabletFormulation1 | 1 | “tabletFormulation1” | { Excipient1, Excipient2} |
| TabletFormulation2 | 2 | “tabletFormulation2” | { Excipient3, Excipient4} |

**Tablet Formulation**

**Test Case**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | Description | Input | | | | Expect Result | | | |
| ID | name | Quantity | excipient list  Substance | ID | name | Quantity | excipient list |
| 1 | Test delete tabletFormulation object which is correct the formal of tabletFormulation object | 1 | “tabletFormulation1” | 7 | { Excipient 3, Excipient 2} | Null | “tabletFormulation3” | 7 | { Excipient 3, Excipient 2} |
| 2 | Test delete  tabletFormulation object which is correct the formal of tabletFormulation object | 2 | “tabletFormulation2” | 2 | { Excipient 1, Excipient 4} | Null | “tabletFormulation4” | 2 | { Excipient 1, Excipient 4} |
| 3 | Test delete tabletFormulation object which is contained in the database already | 3 | “tabletFormulation1” | 1 | { Excipient1, Excipient 2} | null | null | null | null |
| 4 | Test delete tabletFormulation object which is contained in the database already | 4 | “tabletFormulation2” | 2 | { Excipient1, Excipient 2} | null | null | nukl | null |

### Unit Test Case 81 (UTC -81)

**findAll(): TabletFormulation[]**

**Test data**

**Compound Function data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 3 |
| CompoundFunction5 | 5 | “compoundFunction5” | 5 | 1 |
| CompoundFunction6 | 6 | “compoundFunction6” | 3 | 2 |
| CompoundFunction7 | 7 | “compoundFunction7” | 9 | 2 |
| CompoundFunction8 | 8 | “compoundFunction8” | 4 | 1 |

**Substance data**

Substance1= {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”}

Substance2= {1,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance object |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |
| Excipient3 | 3 | 5 | {CompoundFunction5, CompoundFunction6} | Subtance1 |
| Excipient4 | 4 | 7 | {CompoundFunction7, CompoundFunction8} | Subtance2 |

**Excipient data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | name | excipient list |
| TabletFormulation1 | 1 | “tabletFormulation1” | { Excipient1, Excipient2} |
| TabletFormulation2 | 2 | “tabletFormulation2” | { Excipient3, Excipient4} |

**Tablet Formulation**

**Test Case**

|  |  |  |
| --- | --- | --- |
| case | Description | Expect result |
| List of tableFormulation |
| 1 | Test get all tableFormulation list | { tabletFormulation1, tabletFormulation2} |

### Unit Test Case 82 (UTC -82)

**findById(): TabletFormulation**

**Test data**

**Compound Function data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 3 |
| CompoundFunction5 | 5 | “compoundFunction5” | 5 | 1 |
| CompoundFunction6 | 6 | “compoundFunction6” | 3 | 2 |
| CompoundFunction7 | 7 | “compoundFunction7” | 9 | 2 |
| CompoundFunction8 | 8 | “compoundFunction8” | 4 | 1 |

**Substance data**

Substance1= {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”}

Substance2= {1,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance object |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |
| Excipient3 | 3 | 5 | {CompoundFunction5, CompoundFunction6} | Subtance1 |
| Excipient4 | 4 | 7 | {CompoundFunction7, CompoundFunction8} | Subtance2 |

**Excipient data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | name | excipient list |
| TabletFormulation1 | 1 | “tabletFormulation1” | { Excipient1, Excipient2} |
| TabletFormulation2 | 2 | “tabletFormulation2” | { Excipient3, Excipient4} |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| case | Description | Input | Expect Result | | |
| Id | ID | name | excipient list |
| 1 | Test get tabletFormulation object by tabletFormulation id | 1 | 1 | “ tabletFormulation1” | { Excipient1, Excipient2} |
| 2 | Test get tabletFormulation object by TabletFormulation id | 2 | 2 | “tabletFormulation2” | { Excipient3, Excipient4} |
| 3 | Test get tabletFormulation object which is not contain in database | 3 | null | | |
| 4 | Test get tabletFormulation object which is not contain in database | 4 | null | | |

### Unit Test Case 83 (UTC -83)

**findByName(): TabletFormulation**

**Test data**

**Compound Function data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Type | MaxValue | MinValue |
| CompoundFunction1 | 1 | “compoundFunction 1” | 4 | 2 |
| CompoundFunction2 | 2 | “compoundFunction2” | 7 | 1 |
| CompoundFunction3 | 3 | “compoundFunction3” | 3 | 1 |
| CompoundFunction4 | 4 | “compoundFunction4” | 6 | 3 |
| CompoundFunction5 | 5 | “compoundFunction5” | 5 | 1 |
| CompoundFunction6 | 6 | “compoundFunction6” | 3 | 2 |
| CompoundFunction7 | 7 | “compoundFunction7” | 9 | 2 |
| CompoundFunction8 | 8 | “compoundFunction8” | 4 | 1 |

**Substance data**

Substance1= {1,”substance1”,Solubility1,PartitionCoefficient1, Flowability1, Density1,SaltForm1,Solublity1,ParticleSize1,Hygroscopicity1,Solidstate1,Pka,Stability,2,”thailand”}

Substance2= {1,”substance2”,Solubility2,PartitionCoefficient2, Flowability2, Density1,SaltForm1,Solublity2,ParticleSize2,Hygroscopicity2,Solidstate2,Pka,Stability,2,”china”}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Name | ID | Quantity | CompoundFunction list | Substance object |
| Excipient1 | 1 | 1 | { CompoundFunction1, CompoundFunction2} | Subtance1 |
| Excipient2 | 2 | 2 | {CompoundFunction3, CompoundFunction4} | Subtance2 |
| Excipient3 | 3 | 5 | {CompoundFunction5, CompoundFunction6} | Subtance1 |
| Excipient4 | 4 | 7 | {CompoundFunction7, CompoundFunction8} | Subtance2 |

**Excipient data**

|  |  |  |  |
| --- | --- | --- | --- |
| Object Name | ID | name | excipient list |
| TabletFormulation1 | 1 | “tabletFormulation1” | { Excipient1, Excipient2} |
| TabletFormulation2 | 2 | “tabletFormulation2” | { Excipient3, Excipient4} |

**Test Case**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| case | Description | Input | Expect result | | |
| name | ID | name | excipient list |
| 1 | Test get tabletFormulation object by tabletFormulation name | “ tabletFormulation1” | 1 | “ tabletFormulation1” | { Excipient1, Excipient2} |
| 2 | Test get tabletFormulation object by tabletFormulation name | “tabletFormulation2” | 2 | “tabletFormulation2” | { Excipient3, Excipient4} |
| 3 | Test get TabletFormulation object which is not contain in database | “tabletFormulation3” | null | | |
| 4 | Test get TabletFormulation object which is not contain in database | “tabletFormulation4” | null | | |