@Begin

@QCode:{1}

@Serial:{1}

@Permission:{s}

@Ans:{A}

@Question:{ Which of the following pair is isoelectronic (having the same electronic configuration)?}

@Choice1:{ Kr and Cl–}

@Choice2:{ Cl– and Ca2+}

@Choice3:{ Na and Mg2+}

@Choice4:{ C and O2-}

@Choice5:{ Zn and Cu+ }

@End

@Begin

@QCode:{2}

@Serial:{2}

@Permission:{s}

@Ans:{A}

@Question:{ Which set of quantum numbers represents an electron from a 4*d* orbital?

}

@Choice1:{ *n* = 3, *l* = 0, *ml* = 0, *ms* = – ½}

@Choice2:{ *n* = 3, *l* = 2, *ml* = 1, *ms* = + ½}

@Choice3:{ *n* = 4, *l* = 1, *ml* = 1, *ms* = + ½}

@Choice4:{ *n* = 4, *l* = 2, *ml* = –2, *ms* = – ½}

@Choice5:{ *n* = 4, *l* = 3, *ml* = 0, *ms* = + ½}

@End

@Begin

@QCode:{3}

@Serial:{3}

@Permission:{s}

@Ans:{A}

@Question:{ Which of the following compounds will have the LOWEST magnitude lattice energy value?}

@Choice1:{ KCl }

@Choice2:{LiCl}

@Choice3:{NaCl}

@Choice4:{RbCl }

@Choice5:{They are all the same.}

@End

@Begin

@QCode:{4}

@Serial:{4}

@Permission:{s}

@Ans:{A}

@Question:{ Consider the following successive ionization energies (kJ/mol):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE1 | IE2 | IE3 | IE4 | IE5 |
| 736 | 1450 | 7740 | 10500 | 13600 |

Which element would most likely show this trend in ionization energies?}

@Choice1:{ Al }

@Choice2:{ K }

@Choice3:{ Mg }

@Choice4:{ N }

@Choice5:{ Si }

@End

@Begin

@QCode:{5}

@Serial:{5}

@Permission:{s}

@Ans:{A}

@Question:{ What is the wavelength of the photon emitted in a hydrogen atom when an electron goes from energy level 3 to energy level 1?}

@Choice1:{103 nm }

@Choice2:{277 nm }

@Choice3:{345 nm }

@Choice4:{397 nm }

@Choice5:{489 nm }

@End

@Begin

@QCode:{6}

@Serial:{6}

@Permission:{s}

@Ans:{A}

@Question:{ Draw the MOST STABLE Lewis structure for the phosphate ion (PO43–) from the skeletal structure presented below. What is the formal charge on the phosphorous atom?}

@Choice1:{-1}

@Choice2:{0}

@Choice3:{1}

@Choice4:{2}

@Choice5:{3}

@End

@Begin

@QCode:{7}

@Serial:{7}

@Permission:{s}

@Ans:{A}

@Question:{ Which element can have an expanded valence shell beyond 8 electrons?}

@Choice1:{ Carbon }

@Choice2:{ Fluorine }

@Choice3:{ Nitrogen }

@Choice4:{ Oxygen }

@Choice5:{ Phosphorous }

@End

@Begin

@QCode:{8}

@Serial:{8}

@Permission:{s}

@Ans:{A}

@Question:{ Which element’s valence electron(s) experiences the HIGHEST effective nuclear charge (*Z*eff)?}

@Choice1:{ K }

@Choice2:{ Li }

@Choice3:{ Na }

@Choice4:{ O }

@Choice5:{ S }

@End

@Begin

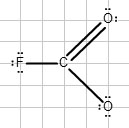
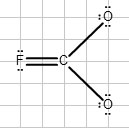
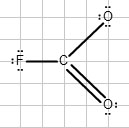
@QCode:{9}

@Serial:{9}

@Permission:{s}

@Ans:{A}

@Question:{ The figures below show three possible resonance structures for an FCO2– ion.

III

II

I

Which structure(s) is MOST favorable according to the formal charges?}

@Choice1:{ I only }

@Choice2:{ II only }

@Choice3:{ III only }

@Choice4:{ I and III only }

@Choice5:{ I, II, and III }

@End

@Begin

@QCode:{10}

@Serial:{10}

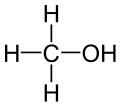
@Permission:{s}

@Ans:{A}

@Question:{ What is the BEST estimate for the molar heat of combustion (Δ*H*combustion) of methanol (CH3OH)? (*Hint: Please make sure that the equation is balanced.*)

CH3OH(*l*) + O2(*g*) 🡪 CO2(*g*) + H2O(*g*)

|  |  |
| --- | --- |
| **Bond** | **Bond Energy (kJ/mol)** |
| C–H | 413 |
| C=O | 799 |
| O=O | 498 |
| H–O | 467 |
| C–C | 347 |
| C–O | 358 |



}

@Choice1:{–3466 kJ }

@Choice2:{–655 kJ }

@Choice3:{+30 kJ }

@Choice4:{+715 kJ }

@Choice5:{+6277 kJ }

@End