Chapter test with answers

Chapter 3 Metallic, ionic and covalent structure and bonding

Time permitted: 30 minutes

|  |  |  |  |
| --- | --- | --- | --- |
|  | Section | Number of questions | Marks available |
| A | Multiple choice | 15 | 15 |
| B | Short answer | 5 | 15 |
|  | Total |  | 30 |

Scale:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A+ | 29–30 | A | 26–28 | B | 23–25 | C | 19–22 | D | 15–18 | E | 9–14 | UG | 0–8 |

Section A Multiple choice (15 marks)

Section A consists of 15 questions, each worth one mark. Each question has only one correct answer. Circle the correct answer. Attempt all questions. Marks will not be deducted for incorrect answers. You are advised to spend no more than 15 minutes on this section.

1 What is the overall charge of the electron cloud of an ion?

A Negative

B Positive

C Neutral

D Cannot be determined without knowing which ion it is

2 Which form of bonding shares released electrons?

A Metallic

B Ionic

C Covalent

D Intermolecular

3 What is the valency of iron in FeCl3?

A +1

B –1

C +3

D –3

4 Which of the following have the same number of valence electrons?

A A neon atom and a sodium ion

B An oxygen atom and a magnesium atom

C A potassium ion and a chlorine atom

D An oxygen atom and a nitrogen atom

5 Which of the following is not a common property of metals?

A Malleable

B Dull

C Ductile

D Good conductor of heat

6 Which of the following is not a variable property of metals?

A Hardness

B Density

C Conductor of electricity

D Melting point

7 Anions are formed when:

A non-metal atoms share electrons.

B metal atoms share electrons.

C metal atoms lose one or more electrons.

D non-metal atoms gain one or more electrons.

8 Which of the following regarding charged particles in ionic compounds is false?

A Charged particles are free to move in the aqueous state.

B Charged particles are free to move in the molten state.

C Charged particles are free to move in the solid state.

D Charged particles are attracted to water molecules.

9 Which type of compound is potassium bromide?

A Metal

B Ionic

C Covalent molecular

D Covalent network

10 What is the correct formula for ammonium hydroxide?

A NH3H

B NH3OH

C NH4H

D NH4OH

11 Which of the following properties is the same for both covalent molecular and covalent network substances?

A Melting point

B Hardness

C Chemical reactivity

D Electrical conductivity

12 Oxygen gas has:

A a single covalent bond.

B a double covalent bond.

C an ionic bond.

D a triple bond.

13 Graphite and diamond are examples of:

A carbon allotropes.

B covalent network solids.

C covalent compounds.

D covalent substances that can conduct electricity.

14 Which of the following shows the general formula for alkanes?

A CnHn.

B CnH2n-2.

C CnH2n.

D CnH2n+2.

15 The term ‘saturated’ when referring to hydrocarbons means the compound:

A undergoes an addition reaction with water.

B is only made up of carbon and hydrogen atoms.

C only contains carbon–carbon single bonds.

D contains multiple bonds between carbon atoms.

Section B Short answer (15 marks)

Section B consists of five questions. Write your answers in the spaces provided. You are advised to spend 20 minutes on this section.

1 Ammonia could also be named mononitrogen trihydride.

a Write the chemical formula for ammonia. (1 mark)

Answer: NH3

b What type of bonding does ammonia possess and how are these bonds formed? (2 marks)

Answer: Ammonia possesses covalent bonds. (1 mark) An electron from the nitrogen atom is shared with one from each hydrogen atom, forming two single covalent bonds. (1 mark)

2 a Draw an electron dot formula for methane. (1 mark)

Answer:

b Describe two physical properties of alkanes. (2 marks)

Answer: Alkanes have low melting and boiling points, both of which increase with molecular mass. (1 mark)

They are insoluble in water but soluble in some other solvents. (1 mark)

3 Describe how melting point, electrical conductivity and solubility in water can be used to distinguish between ionic, covalent molecular and covalent network substances. (3 marks)

Answer:

Melting point: covalent network and ionic substances have high melting points, whereas covalent molecular substances have low melting points. (1 mark)

Electrical conductivity: covalent molecular, ionic and covalent network substances do not conduct electricity in the solid state; however, ionic substances do conduct electricity when molten or aqueous. (1 mark)

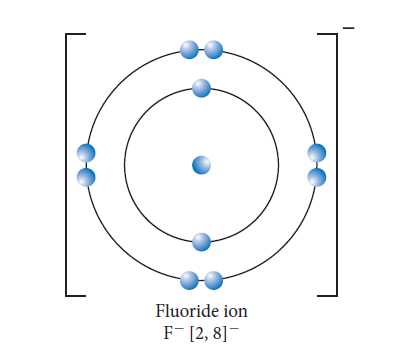
Solubility: ionic substances are generally soluble in water, covalent network substances are generally insoluble, and covalent molecular substances have variable solubility. (1 mark)

4 a Describe how the periodic table can be used to calculate the number of valence electrons in atoms. (1 mark)

Answer: Elements in groups 1 and 2: the group number is equal to the number of valence electrons for these elements. Elements in groups 13–18: the number of valence electrons is equal to (group number – 10).

b Draw an electron configuration diagram for the fluoride ion. (2 marks)

Answer:



5 Write the chemical formula for the following substances. (3 marks)

a iron(III) nitrate

Answer: Fe(NO3)3

b lithium sulfate

Answer: Li2SO4

c aluminium chloride

Answer: AlCl3

End of test (30 marks)