Atomic Structure

(MUF0041 Chemistry Unit 1 Past Year Topical Questions)

Sample Exam Paper Section A

Question 1

What is the maximum number of electrons that can occupy a 2s orbital?

A. 1

B. 2

C. 3

D. 6

Revision Set 1

Question 1

What is the maximum number of electrons that can occupy a 2s orbital?

A. 1

B. 2

C. 3

D. 6

Question 2

What is the maximum number of electrons that can occupy a 3p orbital?

A. 1

B. 2

C. 3

D. 6

Question 3

What is the maximum number of electrons that can occupy a 5d orbital?

A. 10

B. 20

C. 14

D. 6

Question 4

What is the maximum number of electrons that can occupy a 6f orbital?

A. 10

B. 14

C. 8

D. 6

Question 5

What is the maximum number of electrons that can occupy up to the 1st shell?

A. 2

B. 4

C. 8

D. 10

Question 6

What is the maximum number of electrons that can occupy up to the 2ndshell?

A. 2

B. 4

C. 8

D. 10

Chemical Bonding

(MUF0041 Chemistry Unit 1 Past Year Topical Questions)

Sample Exam Paper Section A

Question 7

Which of the following properties indicates the presence of **weak** intermolecular forces in a liquid?

A. Low boiling point

B. Large enthalpy (ΔH) of vaporisation

C. Low vapour pressure

D. High viscosity

Question 8

Which of the following has the greatest metallic character?

A. Al

B. C

C. Cl

D. Na

Question 9

Which of the following has the highest electronegativity?

A. O

B. K

C. C

D. Ca

Question 14

Which of the following halogens would have the highest boiling point?

A. Cl_2

B. Br_2

C. F_2

D. I_2

Question 15

What is the approximate bond angle between Cl–N–Cl in NCl_3?

A. 60°

B. 90°

C. 109.5°

D. 120°

Question 16

Which of the following correctly states all the intermolecular forces for the molecule given?

A. SO_2, dipole-dipole and dispersion forces

B. BF_3, H-bonding and dispersion forces

C. CO_2, dipole-dipole and dispersion forces

D. H_2O, dispersion forces only

Question 17

A substance has the following properties.

Solid is brittle, has a high melting point and cannot conduct electricity.

Solid is also water soluble and produces a solution that can conduct electricity.

Which of the following could the substance be?

A. Sodium nitrate

B. Sodium

C. Graphite

D. Diamond

Chemical Energetics

(MUF0041 Chemistry Unit 1 Past Year Topical Questions)

Sample Exam Paper Section A

Question 2

Compared to an exothermic reaction, an endothermic reaction always has a

A. higher activation energy.

B. greater heat content in the products than in the reactants.

C. slower rate of converting the reactants to products.

D. lower value for the equilibrium constant.

Revision Set 3

Question 25

How much energy is involved to convert 15 g of NaBr from a molten state into a solid state at its melting point? ΔH_{fus} = +25.5 kJ mol^{-1}

A. 25.5 kJ released
B. 25.5 kJ absorbed
C. 3.72 kJ released
D. 3.72 kJ absorbed

Question 26

How much energy is required to convert 2.65 g of NaCl from a solid into a molten liquid at its melting point? ΔH_{fus} = +28.0 kJ mol^{-1}

A. 74.2 kJ
B. 10.6 kJ
C. 1.27 kJ
D. 28.0 kJ

Question 27

The complete combustion of hexane can be represented by the following equation:

$$2C_6H_{14}(g) + 19O_2(g) \rightarrow 12CO_2(g) + 14H_2O(g) \qquad \Delta H = -8326 \text{ kJ mol}^{-1}$$

The energy produced by the complete combustion of 5.00 g of hexane is

A. 242 kJ
B. 484 kJ
C. 4.16×10^4 kJ
D. 2.08×10^4 kJ

Question 32

Consider the following thermochemical equations:

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(l) \qquad \Delta H = -572 \text{ kJ mol}^{-1}$$
$$2H_2(g) + O_2(g) \rightarrow 2H_2O(g) \qquad \Delta H = -484 \text{ kJ mol}^{-1}$$

What is the enthalpy change (ΔH) for the following phase change?

$$H_2O(g) \rightarrow H_2O(l)$$

A. -88 kJ mol^{-1}
B. -44 kJ mol^{-1}
C. $+44$ kJ mol^{-1}
D. $+88$ kJ mol^{-1}

Question 57

The dissolution of solid ammonium nitrate is endothermic. Which of the following statements is correct?

A. Heat is released during the dissolution process and the ΔH is negative.
B. Heat is released during the dissolution process and the ΔH is positive.
C. Heat is absorbed during the dissolution process and the ΔH is negative.
D. Heat is absorbed during the dissolution process and the ΔH is positive.

Question 59

The oxidation of sulfur dioxide is represented by the following equation:

$$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g) \quad \Delta H = -197 \text{ kJ mol}^{-1}$$

The activation energy of the forward reaction is 460 kJ mol^{-1}. What is the activation energy of the reverse reaction?

A. 460 kJ mol^{-1}
B. 263 kJ mol^{-1}
C. 657 kJ mol^{-1}
D. 197 kJ mol^{-1}

Chemical Equilibrium

(MUF0041 Chemistry Unit 1 Past Year Topical Questions)

Revision Set 1

Question 14

Which of the following is **correct** when a reaction is at equilibrium?

A. No new molecules of reactants or products are being formed.

B. The rate of the forward and the reverse reactions is zero.

C. The enthalpy changes (ΔH) of the forward and reverse reactions are equal.

D. There is no change in the number of molecules of reactants or products.

Question 21

The chemical reaction is used industrially in the manufacture of HCN gas is represented by the following equation:

$$CH4(g) + NH_3(g) \rightleftharpoons HCN(g) + 3H_2(g)$$

Which one of the following would increase the yield of HCN?

A. Adding hydrogen gas to the reaction

B. Using a suitable catalyst

C. Increasing the volume of the system

D. Reducing the volume of the system

Question 22

The chemical reaction is used industrially in the manufacture of HCN gas is represented by the following equation:

$$CH_4(g) + NH_3(g) \rightleftharpoons HCN(g) + 3H_2(g)$$

Which one of the following would increase the yield of CH_4?

A. Adding NH_3 gas to the reaction

B. Using a suitable catalyst

C. Increasing the pressure of the system

D. Decreasing pressure of the system

Question 23

For the reaction represented by the equation $H_2(g) + F_2(g) \rightleftharpoons 2HF(g)$, the equilibrium constant at 25 °C is 313. At the same temperature, what is the value of K for the following?

$$2HF(g) \rightleftharpoons H_2(g) + F_2(g)$$

A. 3.19×10^{-3}

B. 17.7

C. 313

D. 5.65×10^{-3}