Name _____ Date _____

End of Chapter 4 test

This test and its sample answers have been written by the authors. IB may award marks differently.

Avogadro constant $N_A = 6.02 \times 10^{23}$ mol^{-1}

1 How many moles of ascorbic acid ($C_6H_8O_6$) contain 1.2×10^{23} hydrogen atoms?

A 0.250

B 0.025

C 0.200

D 0.020

2 If you spend 20 Hong Kong dollars (HKD) on a 500 ml bottle of water, how much does each water molecule cost you?

A 1.2×10^{-24} HKD

B 6.2×10^{-26} HKD

C 0.72 HKD

D 6.2×10^{-23} HKD

3 The mass in kg for one molecule of oxalic acid ($C_2H_2O_4$) is

A 90

B 46

C 1.5×10^{-25}

D 1.5×10^{-19}

4 Which sample has the greatest number of nitrogen atoms?

A 0.15 mol of N_2H_4

B 0.25 mol of HNO_3

C 0.20 mol of $C_6H_5NH_2$

D 18.4 g of N_2O_4

5 Which of the following samples has the least mass?

A 5 mol of H_2O

B 2 mol of CH_3COCH_3

C 1 mol of $FeCl_2$

D 2 mol of NaOH

6 Which of the following is not an empirical formula?

A NH

B CH_2O

C H_2O_2

D Na_3PO_4

7 32 g of an element X combines with oxygen to form the compound XO_3. If 48 g of O_2 gas were used, what is the molar mass of X?

A 32

B 32 g/mol

C 64

D 64 g/mol

8 A compound Y contains the following molecular composition: carbon 60.0%, hydrogen 4.4%, oxygen 35.6%. What could be the molecular formula for Y?

A $C_{10}H_8O_2$

B $C_7H_{14}O_2$

C $C_9H_8O_4$

D $C_6H_{12}O_6$

9 Heating 24.8 g of hydrated sodium thiosulfate crystals ($Na_2S_2O_3 \cdot xH_2O$) to constant mass leaves 15.8 g of anhydrous sodium thiosulfate. What is the value of x?

A 3

B 4

C 5

D 8

10 0.1 mol of a hydrocarbon burns completely in oxygen to produce 13.2 g of carbon dioxide and 5.4 g of water. What is the molecular formula for the hydrocarbon?

A CH_2

B C_2H_4

C C_3H_6

D C_4H_8

11 How much water do you need to add to dilute 500 cm^3 of a 0.20 mol/dm^3 saline solution to 0.0800 mol/dm^3?

A 250 cm^3

B 500 cm^3

C 750 cm^3

D 1250 cm^3

12 80 cm^3 of water is added to 120 cm^3 of a solution of 0.10 mol/dm^3 $AgNO_3$. What is the new concentration of the diluted solution?

A 0.04 mol/dm^3

B 0.06 mol/dm^3

C 0.08 mol/dm^3

D 0.15 mol/dm^3

13 What is the concentration of ammonium ions when 9.6 g of $(NH_4)_2CO_3$ dissolve in water to form 100 cm^3 of aqueous solution?

A 1 mol/dm^3

B 2 mol/dm^3

C 0.001 mol/dm^3

D 0.002 mol/dm^3

Questions 14 and 15 are based on the complete combustion of butane:

$2C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(g)$

14 If 50 cm^3 of butane burn in excess oxygen, how much carbon dioxide is formed at the same temperature and pressure?

A 50 cm^3

B 200 cm^3

C 250 cm^3

D 400 cm^3

15 If 100 cm^3 of butane burn in 700 cm^3 of oxygen, how much carbon dioxide is formed at the same temperature and pressure?

A 400 cm^3

B 431 cm^3

C 700 cm^3

D 800 cm^3

END OF TEST