Year 13 Chemistry Worksheet 3

Day 1

Q1 When **volume increases** due to a decrease in pressure,

A. Charles Law is demonstrated .
B. Boyles Law is demonstrated
C. Daltons Law is demonstrated
D. Combined Gas Law is demonstrated

Q2 Briefly explain why each of the following statements is considered as an important laboratory practice.

(i) Never work alone in the laboratory. **(1 mark)**

(ii) Acids should be added to water with constant stirring. **(1 mark)**

(iii) Dispose of all chemical wastes properly. **(1 mark)**

(iv) Students should never eat food, drink beverages or chew gum inside the laboratory. **(1 mark)**

Q3 Explain the term **hydrogen bonding.** **(1 mark)**

Day 2

Q1 Which of the following could be a possible unit for **molality**?

A. mol kg^{-1}
B. mg kg^{-1}
C. mol L^{-1}
D. g mol^{-1}

Q2 Illustrate the formation of hydrogen bonds between a molecule of water and a molecule of ethanol. **(2 marks)**

Q3 During a laboratory class on the effect of hydrogen bonds, a **pipette** was used to transfer 10 mL of water to a boiling tube. The level was marked and the boiling tube was put in the refrigerator. Upon solidification, ice occupied a greater volume than water.

Give a reason for the difference in volume of ice and water. **(1 mark)**

Day 3

Q1 The average kinetic energy of the particles **increases** due to:

A. the number of collisions
B. a decrease in temperature
C. an increase in temperature
D. a decrease in pressure

Q2 A group of Year 13 students vaporised a sample of unknown liquid in a flask having a volume of 235 mL, at 100 °C. The 0.628 g sample exerted a vapour pressure of 98.4 kPa. Calculate the molar mass of this liquid.

[R = 8.314 J/K.mol] **(2 marks)**

Q3 Briefly explain how the following procedural errors would affect the molar mass in the above experiment.

(i) All the liquid was not vaporised before the flask was removed from the water bath. **(1 mark)**

(ii) The flask with the condensed vapour was not dried properly before the final weighing. **(1 mark)**

Day 4

Q1 Which of the following is the **ideal gas equation**?

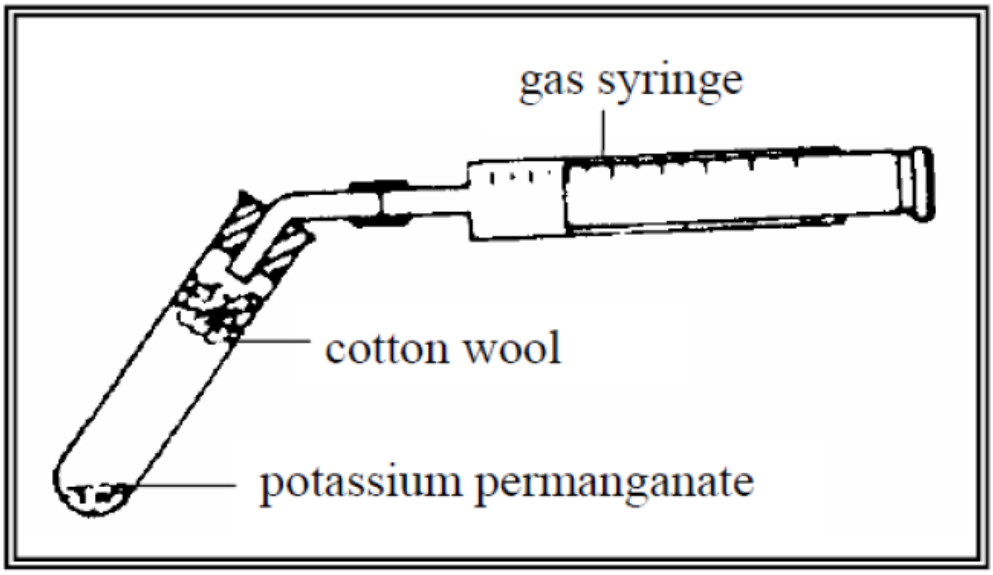
A. $P_1V_1 = P_2V_2$

B. $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

C. $PV = mRT$

D. $PV = nRT$

Q2 The diagram below is the set-up for the determination of the value of the gas constant, R.



(i) List the **five** physical measurements you need to take in order to determine the value of the gas constant, R.

(2½ marks)

(ii) What is the purpose of the cotton wool? **(½ mark)**

(iii) Write the equation for the reaction used in this determination. **(1 mark)**

Q3 State the polarities of water and carbon tetrachloride.

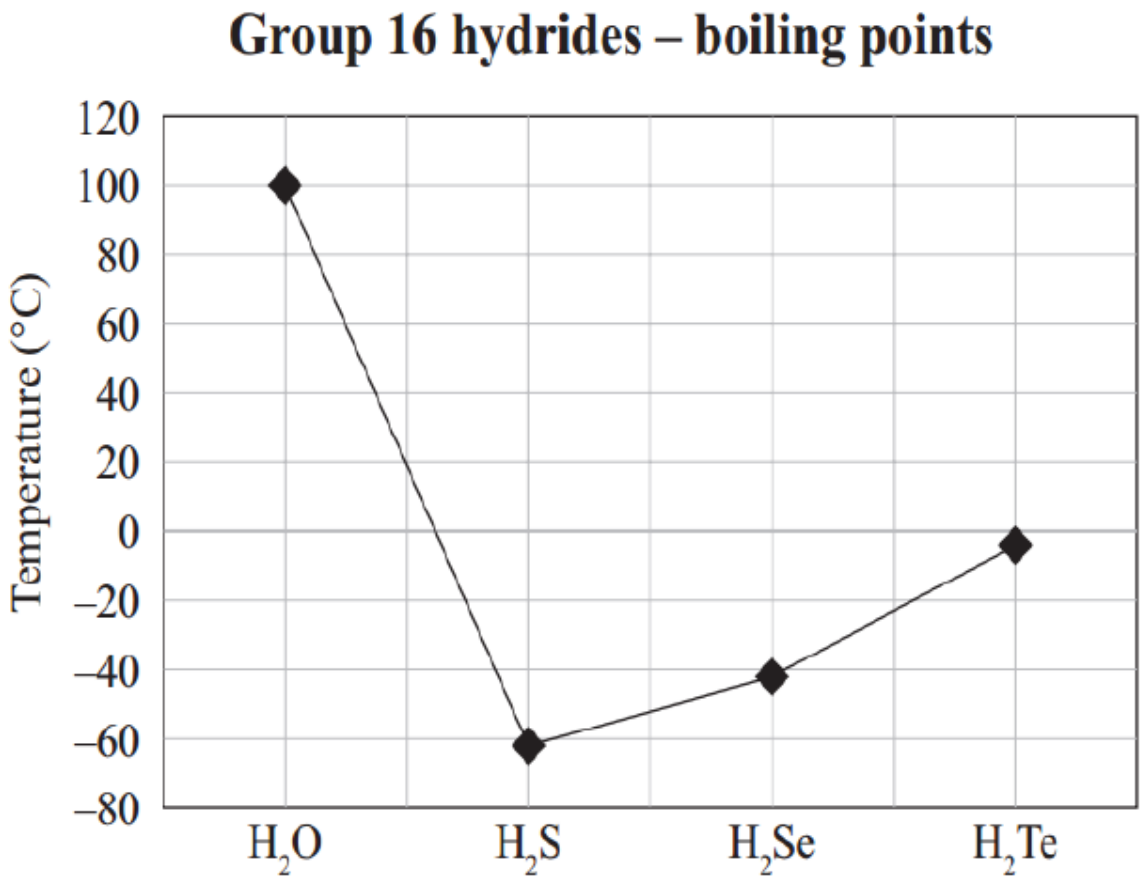
(1 mark)

Day 5

Q1 Ammonia dissolves in water to form a solution with a **pH of 10**. This indicates that ammonia is:

A. acidic
B. basic
C. salt
D. neutral

Q2 Use the graph below to answer the questions that follow:



i) Explain why H_2O has a much higher boiling point than the other hydrides.

(2 marks)

ii) Compare the boiling points of H_2S, H_2Se and H_2Te, and explain the observed trend in terms of bonding and mass.

(1 mark)

Q3 10mL of ethanol was added to 10mL of ethyl acetate. The temperature after mixing was less than the temperature before mixing.

(i) Compare the heat content of the mixture with that of the separate components. **(1 mark)**

(ii) Is the number of hydrogen bonds more or less in the mixture? **(1 mark)**

(iii) Explain the observed temperature change. **(1 mark)**