

Penang Sangam High school

Year 13

Chemistry

Worksheet 5

Question 1

A gas collected over water at 19°C and 101.3 kPa was found to occupy 20 ml. Calculate the volume the dry gas would occupy at STP.

(SVP of water at 19°C = 2.2 kPa)

(hint: before answering you to find your pressure for dry gas, therefore use your knowledge on $P_{\text{total}} = P_a + P_b + P_n$ to find it. Then apply ideal gas law)

Question 2 (use your knowledge on properties and trends in periodic table across and down the group)

Account for the following statements:

- Magnesium chloride conducts electricity in molten state but not in solid state.
- The reactivity of Group I metals increases down the group.
- Increase in temperature increases the volume of a fixed mass of gas when the pressure remains constant.

Question 3 (use your knowledge on quantum numbers and rules of quantum numbers)

- i. State the Hund's rule
- ii. Illustrate the Hund's rule by giving the electron configuration for the sulphur atom using orbital diagram.
- iii. Write down the four quantum numbers for one of the electrons in the second highest energy level of the nitrogen atom.

Question 4

Draw the Lewis structure for the following compounds and predict their shapes using the VSEPR theory. (hint: use your knowledge to write the formulas of each polyatomic ion correctly, then count the electrons present in the ion and distribute around central atom. Do not forget the overall charges outside the braces !)

- Nitrate ions
- Phosphate ions
- Hydronium ions

Question 5

Write down the four quantum numbers for each of the following: (remember the quantum tables we used to draw in class, use the same concept, **n,l,m_l,m_s** ; the arrow $\uparrow\downarrow$ represents electrons)

- a) 7th electron of sodium
- b) 12th electron of calcium
- c) 10th electron of potassium