

CHEMISTRY 11 HYDRATE AND EMPIRICAL FORMULA QUESTIONS

1. Derive the empirical formulae of the substances having the following percentage composition :

- a) Fe : 63.53 % ; S : 36.47 %
- b) Fe : 53.73 % ; S : 46.27 %
- c) Na : 21.6 % ; Cl : 33.3 % ; O : 45.1 %
- d) Cr : 26.52 % ; S : 24.52 % ; O : 48.96 %
- e) C : 63.1 % ; H : 11.92 % ; F : 24.97 %
- f) K : 26.57 % ; Cr : 35.36 % ; O : 38.07 %

2. A 15.00 gram sample of a hydrate was found to contain 7.05 grams of water. If the anhydrous salt left was sodium sulphate, determine the formula of the hydrate.

3. Derive the formulae for these hydrates using the following percentage compositions :

- a) ZnSO_4 : 56.14 % ; H_2O : 43.86 %
- b) Na : 12.10 % ; Al : 14.19 % ; Si : 22.14 %
O : 42.09 % ; H_2O : 9.48 %

4. A compound has the following composition : sodium : 19.3% ; sulphur 26.9 % and the remainder is oxygen. Its GMM is 238. Derive its molecular formula.

5. An organic compound was found to consist of 47.47 % carbon, 10.59 % hydrogen, and the remainder oxygen. What is the empirical formula of this compound ?

6. A carbohydrate on analysis gave the following percentage composition : C 40.00 % ; H 6.71 % ; O 53.29 %. Its molecular mass was found to be 180 grams per mole. Determine the molecular formula of the compound.

Answers :

1. a) FeS b) Fe_2S_3 c) NaClO_3 d) $\text{Cr}_2\text{S}_3\text{O}_{12}$ e) $\text{C}_4\text{H}_9\text{F}$ f) $\text{K}_2\text{Cr}_2\text{O}_7$

2. $\text{Na}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$

3. a) $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ b) $\text{Na}_2\text{Al}_2\text{Si}_3\text{O}_{10} \cdot 2\text{H}_2\text{O}$

4. $\text{Na}_2\text{S}_2\text{O}_8$

5. $\text{C}_3\text{H}_8\text{O}_2$

6. $\text{C}_6\text{H}_{12}\text{O}_6$