

4. (9 points) When water vapor reacted with very hot (glowing) carbon two gases **A** and **B** were formed. The mixture that formed was burnt in pure oxygen. In the room temperature the products were a colorless liquid **C** and a colorless gas **D**. **D** reacted with a dilute calcium hydroxide solution and a white precipitate **E** was formed. Further studies showed that magnesium reacted with gas **D** and two solid substances **F** and **G** were formed. If **D** was let to react with glowing carbon the gas **A** was formed.

Identify substances **A – G**. And write the chemical equations for all the processes described above.

5. (9 points) a) Butane $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3/\text{C}_4\text{H}_{10}$, propanone $\text{CH}_3\text{COCH}_3/(\text{CH}_3)_2\text{CO}$ and propan-1-ol $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}/\text{C}_3\text{H}_7\text{OH}$ all have similar molecular masses. State the type of attractive forces present between the molecules in each of the substances, and predict the order of their increasing boiling points.

b) Which of the following pairs of substances would you expect to form homogeneous solutions when combined? For those that form homogeneous solutions, indicate the type of forces that are involved.

(i) CCl_4 and H_2O

(ii) Br_2 and CCl_4

(iii) KCl and H_2O

(iv) $\text{C}_2\text{H}_5\text{OH}$ and H_2O

c) The word “metal” means a package of properties as follows

- high electrical conductivity
- high thermal conductivity
- malleability and ductility(both of which mean the opposite of brittle)
- (generally) high melting and boiling points

How can the properties accounted for? Justify your answer.