c. The graph below represents the energy changes occurring during the following reaction: $x+y \rightarrow \mathsf{Z}$



- (i) Name the terms labeled P, Q, R and Z.
- (ii) Explain how ΔH remains unchanged when a catalyst is added to the reaction.
- (iii) Using the diagram, give an expression for calculating ΔH .

d. Explain briefly why a lump of ignited charcoal which is a productive burns more vigorously when lowered into a bottle of pure oxygen.

e. Why does hammering a piece of thet metal cause the netable heat up?

3 a.(i) State Deltoi 1 Ew of partial great in C

(ii) What refinement had to be made in Dalton's atomic theory to account for Gay Lussac's results on combining volume?

(iii) Distinguish between vapor and gas.

(iv) Calculate the volume of CO_2 , measured at 19°C and 720mmHg pressure, which would be obtained by the action of excess HCl on 10.0g of Calcium trioxocarbonate (IV).

b. Two identical balloons labeled A and B are respectively filled with equal amount of hydrogen gas at 25^{0} C and 0°C under constant pressure. Which of the balloons is likely to sink in water? Explain

c. A hypothetical gas Q deviates significantly from ideal behavior.

(i) State any two properties of gas Q.

(ii) Under what conditions can gas Q assume ideal behavior? Give reasons for your answer.

(iii) Describe an experiment to support Graham's law of diffusion.

d. (i) List two gases that can be used to demonstrate the fountain experiment. Give reasons for your answer.

e. Describe how to prepare one of the gases named in d(i)