CHEMISTRY ASSIGNMENT

CLASS XI SCIENCE

THERMODYNAMICS

1- Predict the change in internal energy for an isolated system at constant volume.

2- Although heat is a path function but heats absorbed by the system under certain specific conditions is independent of path. What are those conditions? Explain

3- Expansion of gas in a vacuum is called free expansion. Calculate the work is done and the change in internal energy when 1 litre of an ideal gas expands isothermally into a vacuum until its total volume is 5 litre?

4- Heat capacity (Cp) is an extensive property but specific heat (c) is an intensive property. What will be the relation between Cpand c for 1 mol of water?

5-The difference between CP and CV can be derived using the empirical relation H = U + PV. Calculate the difference between CP and CV for 10 moles of an ideal gas.

6-If the combustion of 1g of graphite produces 20.7 kJ of heat, what will be molar enthalpy change? Give the significance of the sign also.

7- net enthalpy change of a reaction is the amount of energy required to break all the bonds in reactant molecules minus the amount of energy required to form all the bonds in the product molecules. What will be the enthalpy change for the following reaction?

$H_2(g) + Br_2(g) \rightarrow 2HBr(g)$

Given that Bond energy of H_2, Br_2 and HBr is 435 kJ mol^{-1}, 192 kJ mol^{-1} and 368 kJ mol^{-1} respectively.

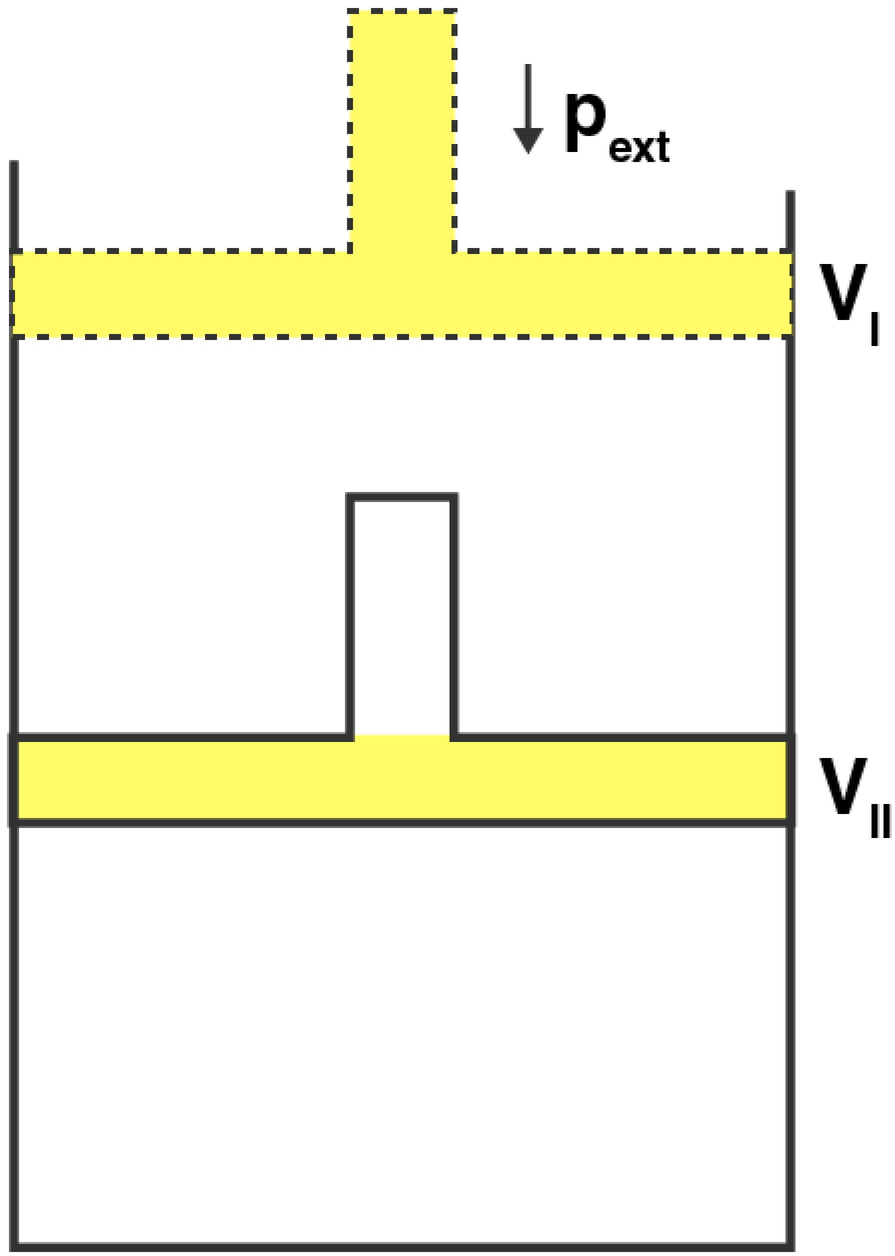
8-The enthalpy of vapourisation of CCl_4 is 30.5 kJ mol^{-1}. Calculate the heat required for the vapourisation of 284 g of CCl_4 at constant pressure. (Molar mass of CCl_4 = 154 g mol^{-1}).

9- The enthalpy of reaction for the reaction :

$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$ is $\Delta_r H^\ominus = -572$ kJ mol^{-1}

What will be standard enthalpy of formation of H_2O (l)?

10-What will be the work done on an ideal gas enclosed in a cylinder, when it is compressed by constant external pressure, pext in a single step as shown in Fig. Explain graphically.



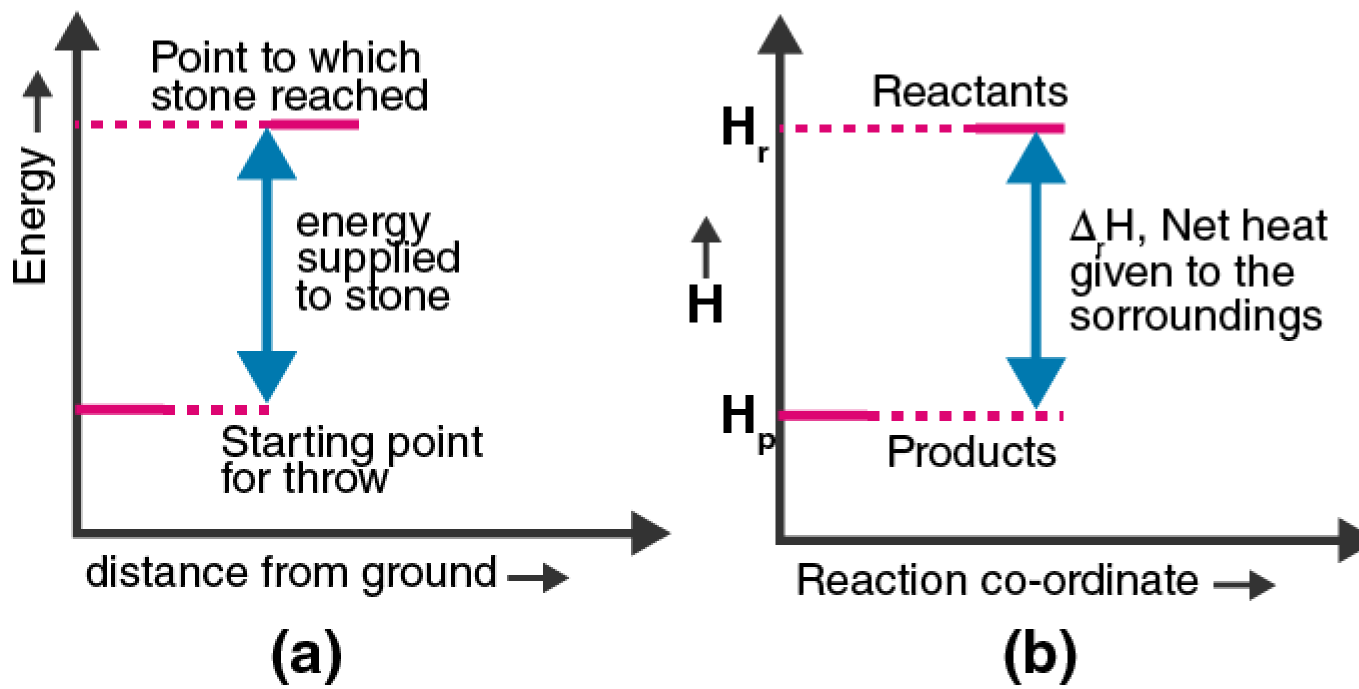
11- How will you calculate work done on an ideal gas in a compression, when a change in pressure is carried out in infinite steps?

12. **Represent the potential energy/enthalpy change in the following processes graphically.**

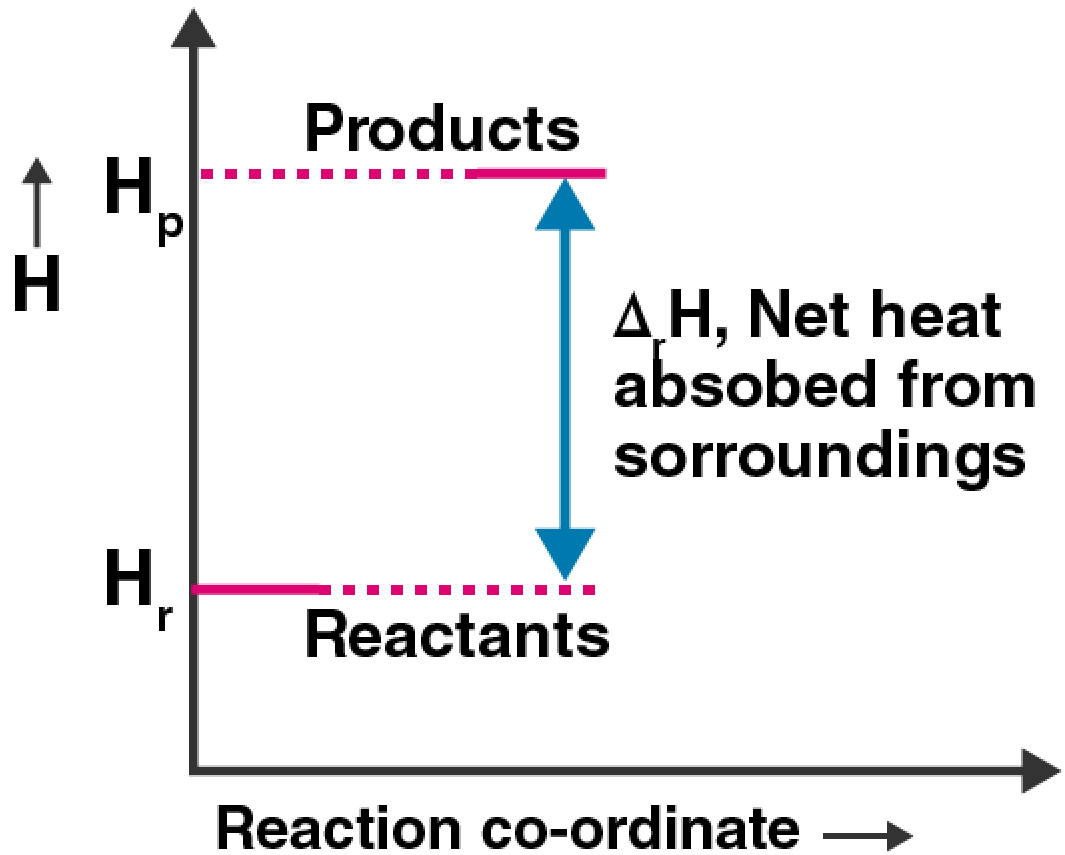
(a) Throwing a stone from the ground to roof.

(b) 1/2 $H_2(g)$ + 1/2 $Cl_2(g)$ ⇋ $HCl(g)$ $\Delta_rH^\ominus = -92.32$ kJ mol^{-1}

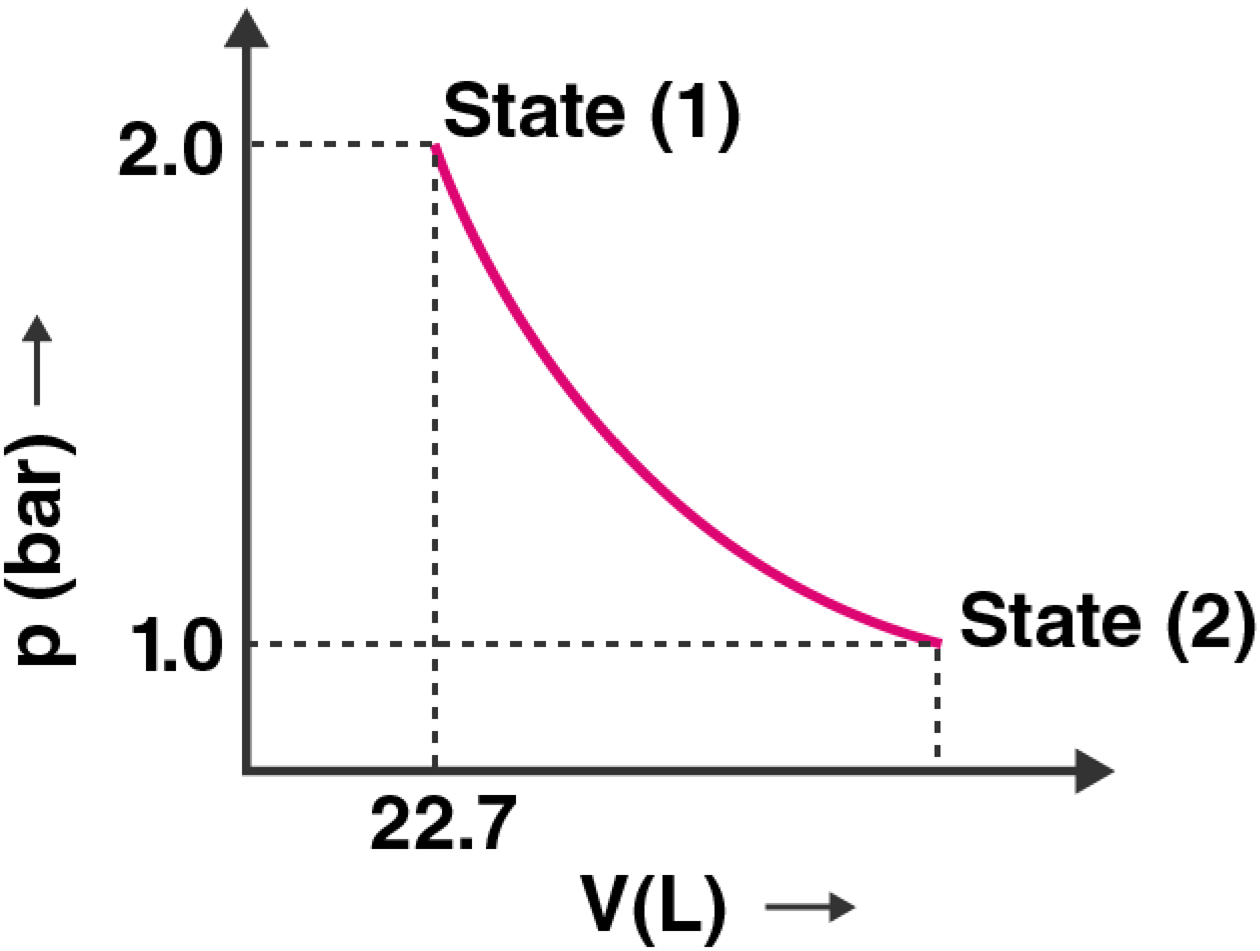
In which of the processes potential energy/enthalpy change is contributing factor to the spontaneity?



13- Enthalpy diagram for a particular reaction is given in Fig. 6.3. Is it possible to decide the spontaneity of a reaction from the given diagram? Explain.



14-1.0 mol of a monoatomic ideal gas is expanded from the state (1) to state (2) as shown in Fig. 6.4. Calculate the work done for the expansion of gas from the state (1) to state (2) at 298 K.



15-. An ideal gas is allowed to expand against a constant pressure of 2 bar from 10 L to 50 L in one step. Calculate the amount of work done by the gas. If the same expansion were carried out reversibly, will the work is done be higher or lower than the earlier case? (Given that 1 L bar = 100J)