Answers- Week 12

12-1. In a liquid the density is independent of pressure so Eq (1) represents a straight line with the slope – dg. In a gas density varies with pressure.

12-3. The gases in the two systems can be labeled by P_1, V_1 and P_2, V_2 respectively. If there is a conducting wall in between. There are two possible observations when they are brought together:

I. There is no change, although $P_1 \neq P_2$ and $V_1 \neq V_2$.

II. Both systems start changing but after a while all changes stop although again the final values $P_1' \neq P_2'$ and $V_1' \neq V_2'$.

Conclusions

I. When there is no change, the systems must be in equilibrium. We call this Thermodynamic or thermal equilibrium.

II. P and V are irrelevant for thermal equilibrium.

III. We need to introduce a new parameter whose equality ensures thermal ≡m between two systems. That parameter is TEMPERATURE.

Two systems can be in thermal equilibrium if and only if they are at the same temperature.

12-5. Heat is the Energy which is exchanged between two systems when they are at different temperatures and there is a conducting wall between them.

Specific heat involves change of temperature it is the quantity of heat which must be transferred to/from a system of unit mass to change its temperature by one degree. Latent Heat is involved when there is a change if state (solid ↔ liquid, liquid ↔ gas) without change of temperature. of

12-7. $\Delta V = 100 x 70 \left|2.1 x 10^{-4} - 9.6 x 10^{-6}\right| cm^3$

$= 1.4 \text{ cm}^3$

12-9. $\theta_F = 2.97°C$

12-11. Heat always "flows" from a pt. at a high temperature to a pt. at a low temperature. That is, a heat current always goes against a temperature gradient.

12-13. $\frac{DQ}{\Delta t} = A e \sigma T^4$

(i) 16

(ii) 2