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Q2. c)

→ Weight of Coal (W) = 4g
Weight of sample after moisture loss (W_1) = 3.75g.
Weight of sample after volatile matter loss (W_2) = 3.35g.
Weight of residue (W_3) = 0.150g.

$$\% \text{ moisture} = \frac{\text{Weight loss due to moisture}}{\text{initial weight of sample}} \times 100 = \frac{W - W_1}{W} \times 100$$

$$\% \text{ moisture} = \frac{4 - 3.75}{4} \times 100^{25} = 6.25\%$$

$$\% \text{ volatile matter} = \frac{\text{Weight loss due to volatile matter loss}}{\text{initial weight of sample}} = \frac{W_1 - W_2}{W} \times 100$$

$$\% \text{ volatile matter} = \frac{3.75 - 3.35}{4} \times 100 = 10\%$$

$$\% \text{ ash} = \frac{\text{Weight of residue}}{\text{initial weight of sample}} \times 100 = \frac{W_3}{W} \times 100 = \frac{0.150}{4} \times 100$$

$$= 3.75\%$$

$$\% F.C = 100 - (\% \text{ moisture} + \% V.M + \% Ash)$$
$$= 100 - (6.25 + 10 + 3.75)$$
$$\% F.C = 80\%$$

Conclusion :
% F.C = 80%
% Moisture = 6.25%
% V.M = 10%
% Ash = 3.75%

Q 2. D)

→ The characteristics of ideal fuel are:

i) Calorific values should be as high as possible.
ii) Ignition temperature - moderate.
iii) Flame temperature should be as high as possible.
iv) Flash and fire point should be as high as possible.
v) Aniline point should be low.
vi) Cloud and Pour ~~should~~ point should be as low as possible.
vii) Viscosity should be adequate.
viii) Coke number should be as high as possible.
ix) Moisture content should be as low as possible.
x) Volatile matter should be as low as possible.
xi) Ash matter should be absent.
xii) Easy risk free transportation should be possible.
xiii) Storage space - Ideally fuel should occupy small space.
xiv) Air requirements - adequate.
xv) Harmless products should be produced on combustion.

Q 2. A)

→ Galvanic Corrosion

The name of the corrosion indicates that there must be formation of a galvanic cell on the metal surface causing corrosion. Such cells get set up all along the surface of metal when it faces the electrolytic environment and two dissimilar metals in contact.

The case where the former type mechanism takes place is seen in electrolytic / alkaline environment while the latter type is seen in acidic environment.

The rate of corrosion is obviously very high in latter type. In former one, for iron metal generally three types of iron oxides are formed in succession with the increasing valency of iron. For example, FeO, Fe_2O_3 and Fe_3O_4.

In such type of environment, on metal surface small anodic and cathodic areas are formed. Here cathodic area is slightly larger and hence rate of corrosion is comparitively ~~light~~ higher. The mechanism of corrosion in slightly alkaline medium proceeds as,

$$\text{At anode: } M \rightarrow M^{2+} + 2e^-$$

$$\text{At cathode: } \frac{1}{2}O_2 + H_2O \rightarrow 2e^- + 2OH^-$$

$$M^{2+} + 2OH^- \rightarrow M(OH)_2 \downarrow$$

If the metals are surrounded by aqueous alkalin/ acidic / neutral solution, the mechanism of cathodic reaction proceeds to form OH^- ions, and subsequently $Fe(OH)_2$ or $Fe(OH)_3$.