(**Q1**) Classify the following redox reactions:
(a) $2\ C_8H_{18} + 25\ O_2 \rightarrow 16\ CO_2 + 18\ H_2O$
Combustion reaction
(b) $P_4 + 10\ Cl_2 \rightarrow 4\ PCl_5$
Combination reaction
(c) $2\ NO \rightarrow N_2 + O_2$
Decomposition reaction
(d) $C + O_2 \rightarrow CO_2$
Combination and combustion reaction

(**Q2**) Calculate the mass of KI in grams required to prepare 5.00×10^2 mL of a 2.80 M solution.
$\mathcal{M}$KI = 166 g/mol
n = 2.8 x 0.5 = 1.4 mol
m = 1.4 x 166 = 232.4 g

(**Q3**) Describe how you would prepare 250 mL of a 0.707 M $NaNO_3$ solution.
Dissolve 15.0 g $NaNO_3$ in enough water to make up 250 mL

(**Q4**) How many grams of KOH are present in 35.0 mL of a 5.50 M solution?
10.8 g

(**Q5**) Calculate the molarity of each of the following solutions:
(a) 6.57 g of methanol (CH_3OH) in 1.50×10^2 mL of solution,
1.37 M
(b) 10.4 g of calcium chloride ($CaCl_2$) in 2.20×10^2 mL of solution,
0.426 M
(c) 7.82 g of naphthalene ($C_{10}H_8$) in 85.2 mL of benzene solution.
0.716 M

(**Q6**) Determine how many grams of each of the following solutes would be needed to make 2.50 x 10^2 mL of a 0.100 M solution:
(a) cesium iodide (CsI),
6.5 g
(b) sulfuric acid (H_2SO_4),
2.45 g
(c) sodium carbonate (Na_2CO_3),
2.65 g
(d) potassium dichromate ($K_2Cr_2O_7$),
7.36 g
(e) potassium permanganate ($KMnO_4$).
3.95 g

(**Q7**) Water is added to 25.0 mL of a 0.866 M KNO_3 solution until the volume of the solution is exactly 500 mL. What is the concentration of the final solution?
0.0433 M

(**Q8**) You have 505 mL of a 0.125 M HCl solution and you want to dilute it to exactly 0.100 M. How much water should you add? Assume volumes are additive.
126.25 mL

(**Q9**) A 46.2-mL, 0.568 M calcium nitrate [$Ca(NO_3)_2$] solution is mixed with 80.5 mL of 1.396 M calcium nitrate solution. Calculate the concentration of the final solution.
1.094 M