Marks

Question 28 — Industrial Chemistry (25 marks)

(a) (i) Define *saponification*. **1**

(ii) Account for the cleaning action of soap. **3**

(b) One of the reactions used to form sulfuric acid is the reaction of oxygen with sulfur dioxide under equilibrium conditions to form sulfur trioxide. **4**

Before the reaction, the concentration of sulfur dioxide was 0.06 mol L^{-1} and the concentration of oxygen was 0.05 mol L^{-1}. After equilibrium was reached, the concentration of sulfur trioxide was 0.04 mol L^{-1}.

Calculate the equilibrium constant, K, for the reaction. Show relevant working.

(c) (i) Use a chemical equation to describe what happens when sulfuric acid is added to water in a laboratory. **2**

(ii) Describe the use of sulfuric acid as an oxidising agent, as a dehydrating agent and as a means of precipitating sulfates. Use chemical equations to illustrate your answer. **3**

(d) During your practical work, you performed a first-hand investigation involving an equilibrium reaction.

(i) Outline the procedure you used. **2**

(ii) Explain how you analysed the equilibrium reaction qualitatively. **4**

(e) Evaluate changes in industrial production methods for sodium hydroxide. **6**