

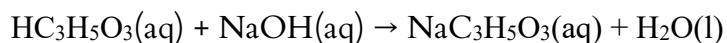
1. The following steps were followed in a method during an experiment to produce a standard solution of potassium chromate:
 - i. 4.22g of solid potassium chromate (K_2CrO_4) was dissolved in a small amount of water and then transferred to a 500mL volumetric flask and made up to the mark with distilled water.
 - ii. 100 mL of this solution was transferred to another 500 mL volumetric flask.
 - iii. The 500 mL volumetric flask was made up to the mark with distilled water.
 - a. Calculate the amount, in mol, of potassium chromate used in step i.
 - b. Calculate the concentration, in mol L⁻¹, of potassium chromate solution formed in step i.
 - c. Calculate the concentration, in g L⁻¹, of potassium chromate solution formed in step i.
 - d. State the concentration of potassium chromate solution, in mol L⁻¹, in the 100 mL solution in step ii.
 - e. Calculate the amount, in mol, in the 100 mL of potassium chromate used in step ii.
 - f. Calculate the concentration, in mol L⁻¹, of potassium chromate solution formed in step iii when the solution is diluted to the 500 mL mark on the volumetric flask.
 - g. State the amount, in mol, of potassium chromate in the 500 mL volumetric flask after step iii is completed.

2. A simple titration is taking place between sodium hydroxide and hydrochloric acid solutions. A pipette contains 20.00 mL of 0.4447 M sodium hydroxide. This requires 17.63 mL of hydrochloric acid to react with it. What is the concentration of the acid?

3. In the titration of a strong acid against a strong base, which of the following statements *best* describes the equivalence point?
 - i. the point at which the rate of the forward reaction equals the rate of the reverse reaction
 - ii. the point at which the same number of moles of acid and base have been put into the flask
 - iii. the point at which the first sign of colour change is seen
 - iv. the point at which equal numbers of moles of H⁺(aq) and OH⁻(aq) have been put into the flask

4. The end point in an acid–base titration is the point when:
 - i. the solution is neutral
 - ii. the indicator changes colour
 - iii. equal volumes of reactants have been mixed
 - iv. reactants have been mixed in the appropriate stoichiometric ratio.

5. Lactic acid, $\text{HC}_3\text{H}_5\text{O}_3$, is a weak monoprotic acid that accumulates as a waste product in muscle tissue during exertion, leading to pain and a feeling of fatigue. What must be the concentration of a sample of lactic acid if 20.00 mL of sodium hydroxide of concentration 0.1426 mol/L requires 24.58 mL of the acid for a complete reaction? The full equation for the reaction is:



6. a Write the balanced full equation for the neutralisation of potassium hydroxide solution by nitric acid.
b What volume of nitric acid of concentration 0.145 mol/L would be required to react completely with 20.00 mL of potassium hydroxide solution of concentration 0.099 mol/L?
7. a Write the balanced full equation for the neutralisation of sodium hydroxide solution by sulfuric acid.
b What volume of sulfuric acid of concentration 0.162 mol/L is needed to exactly neutralise 20.00 mL of sodium hydroxide of concentration 0.250 mol/L?

1. a. 2.17×10^{-2} mol
b. 4.34×10^{-2} M
c. 2.11 gL^{-1}
d. 4.34×10^{-2} M
e. 4.34×10^{-3} mol
f. 8.69×10^{-3} M
g. 4.34×10^{-3} mol
2. 0.5045 M
3. d
4. b
5. 0.116 M
6. a. $\text{KOH(aq)} + \text{HNO}_3(\text{aq}) \rightarrow \text{KNO}_3(\text{aq}) + \text{H}_2\text{O(l)}$
b. 0.0137 L
7. a. $2\text{NaOH(aq)} + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + 2\text{H}_2\text{O(l)}$
b. 0.0154 L