Planning for Kinetics (P)

Appendix:

Common standard procedures in kinetics

1. Diluting a solution

   - Using a burette: Fill a **dry** burette with FA1. Transfer X cm^3 of FA1 into a **dry** 250 cm^3 volumetric flask.
     OR
     Using a pipette: Pipette 25.0 cm^3 of FA1 into a **dry** 250 cm^3 volumetric flask.

   - **Top up to the mark** with deionised water.
   - **Stopper** the flask and **shake/mix well** until a homogeneous solution is obtained.

2. Transferring a solution

   - Example: Using a **dry** 50 cm^3 measuring cylinder, **measure** and **transfer** 30 cm^3 of FA1 into a **dry** 100 cm^3 beaker.

   - State the **capacity** of the apparatus, **volume** of reactant.

   - Everything is **dry**!

3. Transferring the last solution to kickstart the reaction

   - **Rapidly transfer** FA2 into the beaker. Start the stop watch immediately.

   - **Stir** the solution a few times using a **dry** **glass rod**.

4. Endpoint of reaction

   - Example: When the solution in the beaker turns from **brown** to (completely) **colourless**, **stop** the stopwatch and **record** the time taken for the solution to turn **colourless**.

   - Above: State the **colour change**. **Stop** the stopwatch. **Record** the time.

   - When the **white precipitate** in the beaker **completely obstructs** the 'X' marked on the while tile, **stop** the stopwatch and **record** the time taken for the time taken for the 'X' to be obstructed.

   - In general: State the **criteria** for the **endpoint** to be reached.

Planning for Kinetics (P)

5. Repeat the experiment with varying concentrations

- Repeat (steps A to B) according to the **table** below. Using a measuring cylinder, add **deionised water** to keep the **total volume** of the final reaction mixture **constant**.

- Remember to **draw your table**.
  - Even if the volume of reactants used throughout the sets are the **same**, there still needs to be a column for that.
  - Correct headers with **units**.
  - Have a column for separate **volumes of all reactants**.

6. Varying the temperature of solutions

- **Example**

  Place the measuring cylinders in the water bath which is prepared by **mixing tap water and ice water**.

  Place a (0.2°C interval) **thermometer** inside A and leave to allow both tubes inside the water bath for some time solutions in the boiling tubes to **equilibrate at 15°C**.

  (Adding process, start stopwatch)

  Stir well with the **thermometer**.

  (Endpoint reached, stop stopwatch)

  Record the **final temperature** of the **solution**. (If required show the working to calculate the average of the final and initial temperature)

  Repeat the experiment for X other temperatures of T_1, T_2, T_3, T_4…

  For temperature **above room temperature**, prepare the water bath by mixing tap water and **hot water**.

  For temperature **below room temperature**, prepare the water bath by mixing tap water and **ice water**.

- State how the water bath is prepared.
- Record the **initial** and **final** temperature of the solution.

Planning for Kinetics (P)

7. Withdrawing aliquots and quenching process

- (Reaction is prepared and has started, start stopwatch)
- **Before X mins** from the start time, **pipette** 10.0 cm^3 of the reaction mixture into a dry 250 cm^3 conical flask.
- **At X mins**, quench the withdrawn sample by adding 100 cm^3 of cold water/any other quenching reagent. **Record** the **exact time of quenching**.
- Carry out the **titration** of the quenched sample.
- **Before X mins**, repeat steps A to B. Carry out the **titration** of each quenched sample.

8. Gas collection

- (Adding of reactants into conical flask except the reactant that kickstarts the reaction)
- Set up the experiment as shown in the diagram (Note: the stopper should be open)
- (Add the reactant that kickstarts the reaction)
- **Stopper** the conical flask **immediately** (Note: **only** use a **conical flask** to contain the reactant mixture) by inserting the rubber stopper at the mouth of the conical flask. **Start** the stopwatch **at the same time**.
- Swirl the conical flask a few times gently and regularly. **Record** the reading on the gas syringe **every 0.5 minutes** until the reaction is complete. (That is when 3 consecutive readings recorded are the same/show no increase.)