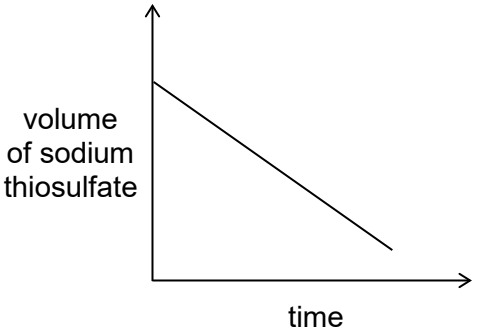
(a) Procedure

1. Using a 50 cm^3 measuring cylinder, transfer 30 cm^3 of $I_2(aq)$ into a 250 cm^3 beaker. To the same beaker, add 30 cm^3 of $H_2SO_4(aq)$ using another 50 cm^3 measuring cylinder.
2. Measure 30 cm^3 of $CH_3COCH_3(aq)$ into a 50 cm^3 measuring cylinder.
3. Add the $CH_3COCH_3(aq)$ into the same 250 cm^3 beaker in step 1. Start the stopwatch immediately. Stir the mixture using a glass rod to ensure even mixing.
4. Using a 10.0 cm^3 pipette, transfer 10.0 cm^3 of the reaction mixture into a 250 cm^3 conical flask. At time 2 min, add 10 cm^3 of $NaHCO_3(aq)$, measured using a 10 cm^3 measuring cylinder, into the 250 cm^3 conical flask.
5. Immediately titrate the iodine present in the conical flask against $Na_2S_2O_3(aq)$ from a burette, until the solution turns pale yellow. Add 1 cm^3 starch from a dropper and continue the titration until the blue-black solution in the conical flask turns colourless.
6. Repeat steps 4 and 5 at 6, 10, 14, 18, 22, 26 minutes.
7. Record the titration results in a suitable table.

(b)



The volume of $Na_2S_2O_3$ used for titrating a sample of quenched aliquot at time t is proportional to the concentration of I_2 present in the reaction mixture at time t.

Since the gradient of the graph is constant with a negative value, the rate of reaction is constant. Hence, the order of reaction with respect to iodine is zero since the reaction rate is independent of the concentration of iodine.