

Chemguide – questions

ALDEHYDES AND KETONES: OXIDATION

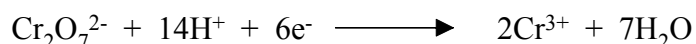
1. a) Complete the following table showing the reactions of aldehydes and ketones with a variety of oxidising agents.

Oxidising agent	Observations with	
	an aldehyde	a ketone
Potassium dichromate(VI) solution acidified with dilute sulphuric acid		
Tollens' reagent (containing the $[\text{Ag}(\text{NH}_3)_2]^+$ ion). Warm gently.		
Fehling's solution or Benedict's solution. Warm gently.		

- b) Why is there a difference between aldehydes and ketones?
- c) Why can't potassium manganate(VII) solution acidified with dilute sulphuric acid be used as a test to distinguish between aldehydes and ketones?
2. a) If you reacted ethanal with acidified potassium dichromate(VI) solution, what organic product would you get?

b) Write the electron-half-equation for the formation of that product from ethanal.

c) The electron-half-equation for the dichromate(VI) ion acting as an oxidising agent is

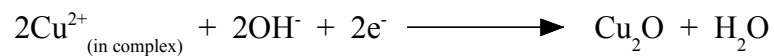


Use this equation and the one you wrote in part (b) to work out the ionic equation for the reaction.

3. a) Tollens' reagent is alkaline because of the sodium hydroxide solution and ammonia solution used to make it. What organic product would you get in this case if you reacted ethanal with Tollens' reagent?
- b) Write the electron-half-equation for the formation of that product from ethanal.
- c) Write the electron-half-equation for the reaction of the $[\text{Ag}(\text{NH}_3)_2]^+$ ion when it forms the visible product of the reaction.
- d) Combine these two electron-half-equations to give an ionic equation for the reaction of Tollens' reagent with ethanal.

Chemguide – questions

4. Fehling's solution and Benedict's solution both contain copper(II) complexes in an alkaline solution. The copper(II) complex can be simplified to $\text{Cu}^{2+}_{(\text{in complex})}$, and the electron-half-equation given as



- a) Write the electron-half-equation for the oxidation of propanal in an alkaline solution.
- b) Combine this with the equation above to give the ionic equation for the reaction between Fehling's or Benedict's solution with propanal.