Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1

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Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

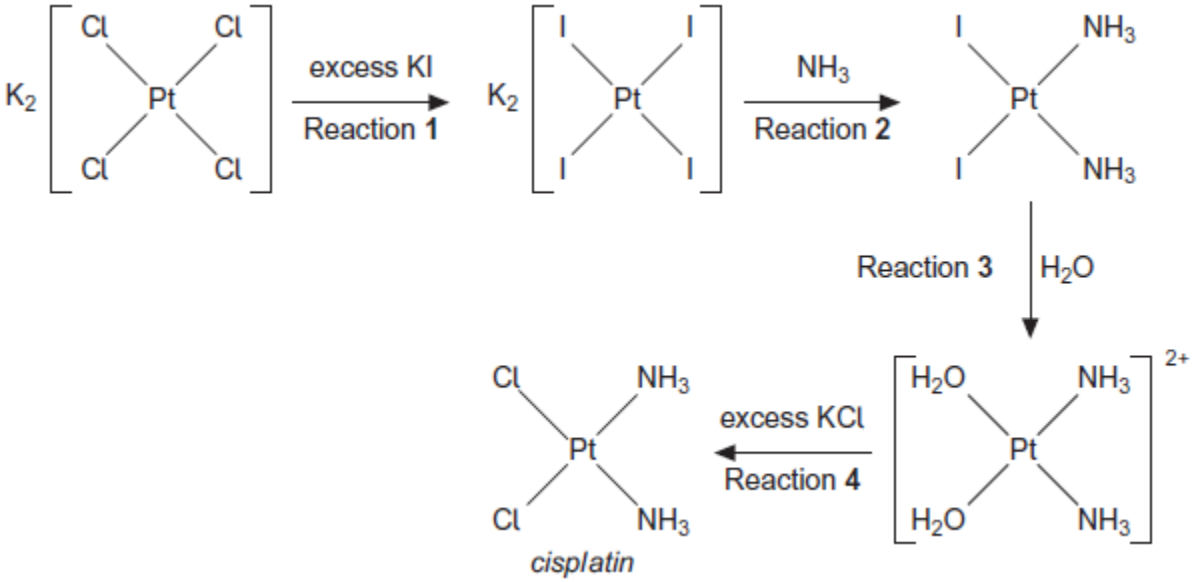
Q1.

Complexes containing transition elements have a wide variety of uses including acting as dyestuffs like *Prussian Blue*.

Cisplatin is a platinum-based chemotherapy drug used to treat various types of cancers. It was the first member of a class of anti-cancer drugs that react with DNA in tumour cells.

Cisplatin is prepared from K_2PtCl_4 according to the following scheme.

All the reactions shown are reversible.



(a) Name the type of reaction occurring in all four steps of the scheme.

_____

(1)

(b) Explain why an excess of potassium iodide is used in Reaction **1**.

_____

_____

_____

(2)

(c) (i) Write an equation for Reaction **1**.

_____

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_____

(1)

(ii) Calculate the percentage atom economy for the formation of K_2PtI_4 in Reaction **1**. Show your working.

_____

_____

_____

_____

(2)

(d) In Reaction **3**, silver nitrate solution is added to improve the yield of product.

(i) Write the **simplest ionic** equation for the reaction of iodide ions with silver nitrate.

_____

(1)

(ii) Suggest why addition of silver nitrate improves the yield of product from Reaction **3**.

_____

_____

(1)

(e) Suggest two reasons, other than poor practical technique, why the overall yield of *cisplatin* in this synthesis may be low.

Reason 1 _____

_____

Reason 2 _____

_____

(2)

(f) The *cisplatin* formed in Reaction **4** is impure. Outline how the impure solid is purified by recrystallisation.

_____

_____

_____

_____

_____

(3)

(g) Platinum compounds are highly toxic.

(i) State why *cisplatin* is used in cancer treatment despite its toxicity.

_____

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_____

(1)

(ii) Suggest a suitable precaution that should be taken by medical staff when using *cisplatin*.

_____

(1)

(Total 15 marks)

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Q2.

(a) Some metal ions are toxic to humans. A substance that can be used to treat such poisoning contains the ion $EDTA^{4-}$.
$EDTA^{4-}$ forms very stable complexes with metal ions. These complexes are **not** toxic.

(i) Write an equation for the reaction of $EDTA^{4-}$ with aqueous copper(II) ions, $[Cu(H_2O)_6]^{2+}$.

_____

(1)

(ii) A solution containing $EDTA^{4-}$ can also be used in a titration to determine the concentration of metal ions in solution.
A river was polluted with copper(II) ions. When a 25.0 cm^3 sample of the river water was titrated with a 0.0150 mol dm^{-3} solution of $EDTA^{4-}$, 6.45 cm^3 were required for complete reaction.
Calculate the concentration, in mol dm^{-3}, of copper(II) ions in the river water.
Show your working.

_____

_____

_____

_____

(2)

(b) The determination of the concentration of copper(II) ions in a single sample of river water gives an unreliable value for the copper(II) ion pollution in the river.
Give one reason why this value is unreliable.

_____

_____

(1)

(c) Silver complexes can be used to identify a particular organic functional group.
Give **one** example of a silver complex that can be used in this way and state the organic functional group it identifies.

Silver complex _____

Organic functional group _____

(2)

(Total 6 marks)

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