

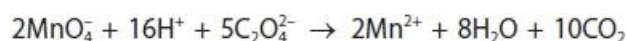
Questions

Q1.

Answer the question with a cross in the box you think is correct . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

This is a question about catalysis.

The rate of oxidation of ethanedioate ions by manganate(VII) ions starts slowly and then rapidly increases.



What is the catalyst in this reaction?

- A CO_2
 B H^+
 C Mn^{2+}
 D MnO_4^-

(1)

(Total for question = 1 mark)

Q2.

This question is about transition metals.

Which **best** explains why $[\text{Cu}(\text{NH}_3)_2]^+$ ions are colourless?

- A all complex ions having a metal ion with a +1 charge are colourless
 B no electronic transitions can take place between d -orbitals
 C the d -orbitals cannot split in energy
 D there are no electrons in the d -subshell

(1)

(Total for question = 1 mark)

Q3.

Iron and zinc are in the d-block of the Periodic Table.

Which of these is the electronic configuration of an iron(II) ion, Fe²⁺?

(1)

		3d					4s	
<input type="checkbox"/>	A	[Ar]	↑↓	↑↓	↑↓			
<input type="checkbox"/>	B	[Ar]	↑↓	↑	↑	↑	↑	
<input type="checkbox"/>	C	[Ar]	↑↓	↑↓				↑↓
<input type="checkbox"/>	D	[Ar]	↑	↑	↑	↑		↑↓

(Total for question = 1 mark)

Q4.

This question is about transition metals.

Which of these ions has the electronic configuration [Ar]3d⁵?

(1)

- A Cr³⁺
- B Fe²⁺
- C Mn²⁺
- D Mn³⁺

(Total for question = 1 mark)

Q5.

This question is about transition metals.

Which type or types of bonding exist **within** the complex ion $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$?

(1)

- A** dative covalent only
- B** dative covalent and covalent only
- C** dative covalent and ionic only
- D** dative covalent, covalent and ionic

(Total for question = 1 mark)

Q6.

This question is about how catalysts work.

Gaseous reactants attach to the catalytic surface by the process of

(1)

- A** absorption
- B** activation
- C** adsorption
- D** desorption

(Total for question = 1 mark)

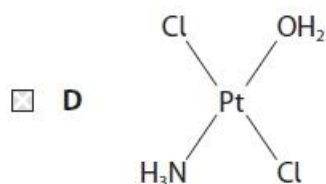
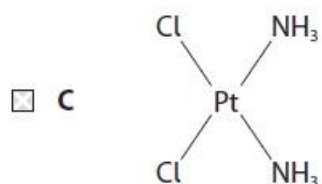
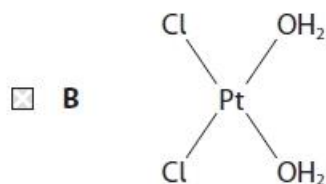
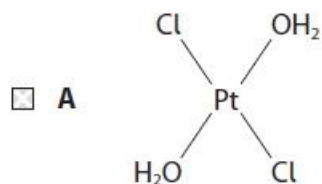
Q7.

Answer the question with a cross in the box you think is correct . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

Transition metals form complex ions.

Which of these complexes is used in the treatment of cancer?

(1)



(Total for question = 1 mark)

Mark Scheme

Q1.

Question Number	Answer	Mark
	<p>The only correct answer is C</p> <p><i>A is not correct because only Mn²⁺ is an autocatalyst for this reaction</i></p> <p><i>B is not correct because only Mn²⁺ is an autocatalyst for this reaction</i></p> <p><i>D is not correct because only Mn²⁺ is an autocatalyst for this reaction</i></p>	(1)

Q2.

Question Number	Answer	Mark
	<p>The only correct answer is B</p> <p><i>A is not correct because it is not an explanation</i></p> <p><i>C is not correct because the d-orbitals can be split in energy</i></p> <p><i>D is not correct because there are ten electrons in the d-subshell</i></p>	(1)

Q3.

Question Number	Answer	Mark
	<p>The only correct answer is B</p> <p><i>A is not correct because 4 of the 3d electrons should be unpaired</i></p> <p><i>C is not correct because there should not be any electrons in the 4s orbital</i></p> <p><i>D is not correct because there should not be any electrons in the 4s orbital</i></p>	(1)

Q4.

Question Number	Answer	Mark
	<p>The only correct answer is C</p> <p><i>A is not correct because it is $3d^3$ not $3d^5$</i></p> <p><i>B is not correct because it is $3d^6$ not $3d^5$</i></p> <p><i>D is not correct because it is $3d^4$ not $3d^5$</i></p>	(1)

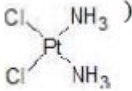
Q5.

Question Number	Answer	Mark
	<p>The only correct answer is B</p> <p><i>A is not correct because covalent is missing</i></p> <p><i>C is not correct because it has ionic is incorrect</i></p> <p><i>D is not correct because it has ionic is incorrect</i></p>	(1)

Q6.

Question Number	Acceptable Answer	Mark
	<p>The only correct answer is C</p> <p><i>A is incorrect because gaseous reactants attach only to the surface</i></p> <p><i>B is incorrect because this happens after adsorption</i></p> <p><i>D is incorrect because this is detachment of the products from the surface</i></p>	(1)

Q7.

Question Number	Answer	Mark
	<p>The only correct answer is C ()</p> <p><i>A is not correct because water is not one of the ligands and the configuration of chloride ions should be cis not trans</i></p> <p><i>B is not correct because water is not one of the ligands</i></p> <p><i>D is not correct because the configuration should be cis not trans for the chloride ligands and one of the other ligands is a water molecule rather than ammonia</i></p>	(1)