Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Physical

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Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Mark Schemes

Q1.

(a) **M1** absorb (some) wavelengths/frequencies/colours/energies of (visible) light

wavelengths/frequencies/colours/energies of (visible) light only needed once in the answer

Allow absorption of a photon of light NOT uv light

1

M2 to promote/excite electrons in d-orbitals

Allow d-subshell / d-energy level / d-electrons Reference to 'd' can appear anywhere in the answer

1

M3 remaining/complementary wavelengths/frequencies/colours/energies of (visible) light reflected/transmitted (to give colour seen)

NOT emissions/emitting or 'give out'

1

(b) **M1** $(\Delta)E = \frac{hc}{\lambda}$

Allow in two stages / expressed in words

1

M2 490×10^{-9}

M2 for conversion

1

M3 $= (6.63 \times 10^{-34} \times \frac{3.00 \times 10^{8}}{490 \times 10^{-9}}{}_{490 \times 10^{-9}}) = 4.06 \times 10^{-19}$ J

Correct answer scores 3 marks

4.06×10^{-n} scores 2 marks (no M2)

9.75×10^{-32} = 1 mark (M2)

1

(c) **M1** **measure** absorbance for (a range of) known concentrations

Insist on description of taking measurements

1

M2 plot graph absorbance v concentration

Allow concentration v absorbance

1

M3 read value of concentration for the measured absorbance from this graph

If no M1, must mention both variables

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Need to describe HOW they use the graph

1

(d) **M1** amount of iron in each tablet = $4.66 \times 10^{-3} \times \frac{250}{1000}$ (= 0.001165 mol)

1

M2 mass of iron in each tablet = $4.66 \times 10^{-3} \times \frac{250}{1000} \times 55.8 = 0.0650\ g = 65\ mg$

Correct answer = 2 marks

Allow M2 for (M1 x 55.8 x 1000)

1

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Q2.

(a) DNA Replication

NOT mitosis
NOT DNA synthesis
Ignore terms relating to cell division processes
Ignore 'damages DNA'
Ignore DNA transcription
Ignore 'cell replication'

1

(b) $[Pt(NH_3)_2Cl_2] + H_2O \rightarrow [Pt(NH_3)_2Cl(H_2O)]^+ + Cl^-$

M1 *Correct formula* ***and*** *charge of B*

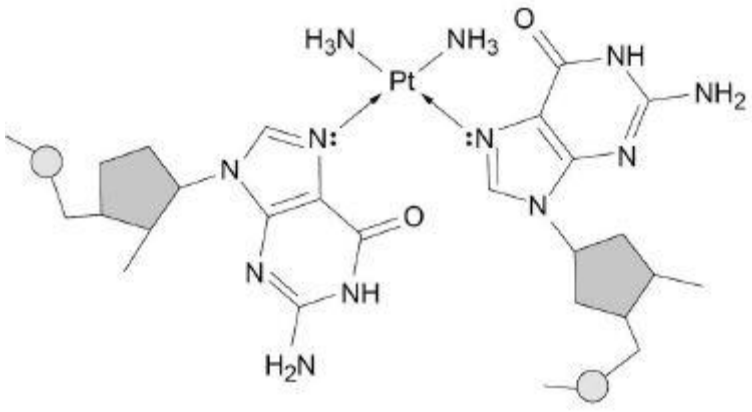
1

M2 *Correct balancing* ***and*** *charges in equation*

1

Allow ***M2*** *if the* ***only*** *error in complex B is the charge*
*(****M1*** *not awarded) with* Cl^- ***only***
ALLOW complexes without [ ] and/or ( ) around H_2O
IGNORE ( ) around Cl
NOT any additional different species (loses ***M2****)*
(allow uncancelled water on both sides)

(c)



M1 *Pt in a cis-diammine complex bonded to the correct nitrogen atoms*
Pt must have the two ammonia ligands shown
NOT if drawn as trans
IGNORE any charge on Pt
Ignore any wedges and dashes (3D representations)

1

M2 *both lone pairs shown* ***OR*** *two arrows indicating co-ordinate bonds*
Allow ***M2*** *if bonds to platinum are from the incorrect nitrogen atoms*

1

(d) **M1** plot concentration (y-axis) against time (x-axis) **and** take tangents / (calculate the) gradients (to calculate rates)

Allow concentration-time graph
NOT time-concentration graph (unless clarified in words or sketch) but mark on

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1

M2 Plot rate/gradients against conc

1

M3 straight line through origin / directly proportional confirms first order

allow first order if rate halves/doubles when conc halves/doubles

1

*Alternatives to **M2** and **M3**:*

***M2** Plot a graph of log rate vs log conc*
***M3** (Straight) line of gradient = 1*

***M2** measure (at least) two half-lives (in this case, tangents not required for M1)*
***M3** constant half-life means first order*

***M2** compare rates/gradients at different concentrations*
***M3** first order if rate halves when conc halves*

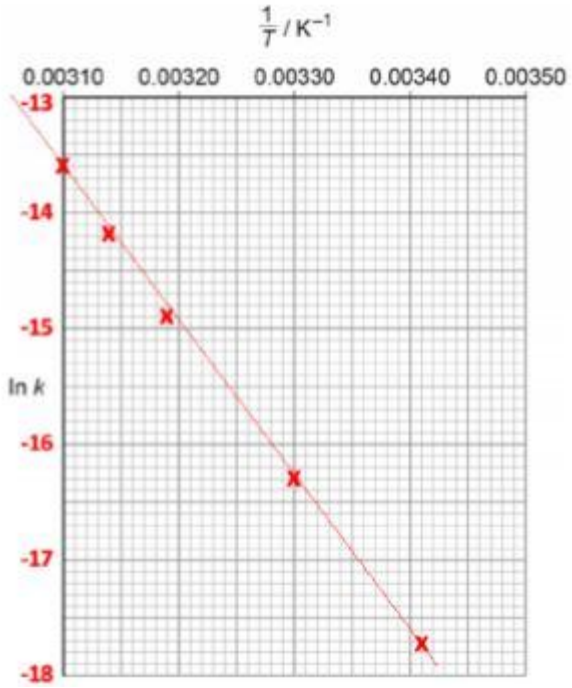
(e)

temperature, T / K	$\frac{1}{T}$ / K^{-1}	rate constant, k / s^{-1}	ln k
318	0.00314	6.63×10^{-7}	−14.2

Allow 3.14×10^{-3}

2

(f)



Gradient = −13 125

$\left(-13125 = \frac{-E_a}{R}\right)$

E_a = 13 125 x 8.31 = 109 069
= 109 (kJ mol^{-1})

Vertical axis with sensible scales (plotted points must take up more than half the grid) NOT M1 if y-axis in wrong direction

1

all points plotted correctly (within ±0.5 small square)

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Best fit straight line based on the student's data (ignoring anomalous point if relevant) **1**

Gradient calculated within range: 12876 - 13598 **1**

Mark is for their (gradient x 8.31) ***and*** *conversion into kJmol^{-1}* **1**

E_a in the range: 107 – 114 kJ mol^{-1}

NOT a negative activation energy

1

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