MATIGO EXAMINATIONS BOARD

545/3
CHEMISTRY
MARKING GUIDE 2023
PAPER 3

<table>
<tr><th>Qn</th><th>Answer</th><th>marks</th></tr>
<tr><td>1</td><td>
1. Table of results:
Room temperature 25.0°C (1 mark)
<table>
<tr><td>Temperature (°C)</td><td>Room temp</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td></tr>
<tr><td>Time, t, for yellow colouration to cover cross (s)</td><td>100.0</td><td>65.0</td><td>44.0</td><td>30.0</td><td>21.0</td><td>18.0</td></tr>
<tr><td>$^1/_t$ (s^{-1})</td><td>0.010</td><td>0.015</td><td>0.023</td><td>0.033</td><td>0.048</td><td>0.056</td></tr>
</table>
(9 marks)
Marks awarded in table for:

Trend of values of time taken all decreasing, regardless of what values
1 d.p on times carries full mark for each value, deduct $^1/_2$ for no d.p
Values of $^1/_t$ to 3 d.p written either in scientific notation or not (each $^1/_2$ mark)

</td><td></td></tr>
<tr><td>(b)</td><td>GRAPH IS ON THE GRAPH PAPER ATTACHED.</td><td></td></tr>
<tr><td>(c)</td><td>Rate of the reaction ($^1/_t$) increases with increase in temperature</td><td></td></tr>
<tr><td>(d)</td><td>Increase in temperature increases kinetic energy of reactant molecules, the molecules collide more frequently and with sufficient energy to be transformed into products at faster rate.</td><td></td></tr>
</table>

2		OBSERVATIONS	DEDUCTIONS		
		a) Pale *green powdered* solid Colourless gas that turns moist blue *litmus paper red* and *lime water milky* *Black residue*	Cu^{2+} or Fe^{2+} CO_2 gas, hence CO_3^{2-} probably CuO, hence Cu		
		b) *Effervescence* occurs bubbles of a colourless gas that turns blue *litmus paper red* and *lime water milky.* *Pale blue solution formed.*	CO_2 gas evolved; CO_3^{2-} confirmed Cu^{2+}		
		c) *Pale blue precipitate* i*nsoluble* in excess *Colourless filtrate* *Pale blue residue*	Cu^{2+} Zn^{2+}, Al^{3+}, Pb^{2+} probably Cu^{2+}		
		d) *White precipitate soluble* in the acid forming a colourless solution.	Zn^{2+}, Al^{3+}, Pb^{2+} probably		
		i) *White precipitate soluble* in excess forming a colourless solution.	Zn^{2+}, Al^{3+}, Pb^{2+} probably		
		ii) *white precipitate insoluble* in excess	Al^{3+}, Pb^{2+} probably		
		iii) *white precipitate*	Pb^{2+}		
		iv) Test: To fourth part is added a few drops of potassium iodide solution. Observation: Bright yellow precipitate	 Pb^{2+} confirmed		
		e) Pale blue residue *turns black*	CuO formed; hence Cu^{2+}		
		f) Dissolves to form a *pale blue solution*	Cu^{2+}		
		i) *Pale blue precipitate insoluble* in excess	Cu^{2+}		
		ii) *Pale blue precipitate soluble* in excess forming a *deep blue solution*	Cu^{2+}		
		iii) Pale blue solution fades into a *colourless solution* and a *brown solid* deposit is formed.	Cu^{2+} displaced to form Cu; Cu^{2+} confirmed		

	(g)(i) The cations in Q **Pb^{2+}** and **Cu^{2+}** ii) Anion in Q **CO_3^{2-}**	
	END **(+256780413120)**