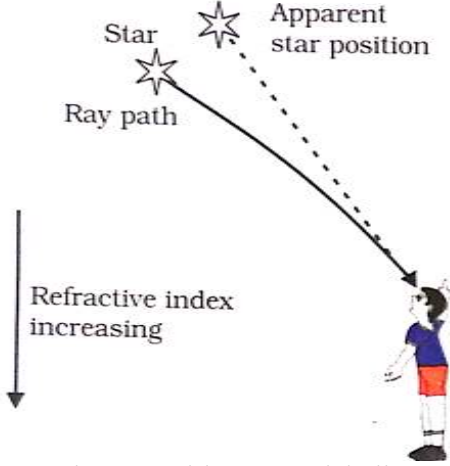
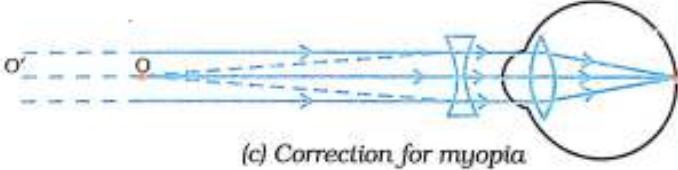


**Strictly Confidential: (For Internal and Restricted use only)**  
**Secondary School Examination**  
**March 2019**  
**Marking Scheme – SCIENCE (SUBJECT CODE 086)**  
**(PAPER CODE – 31/3/3)**

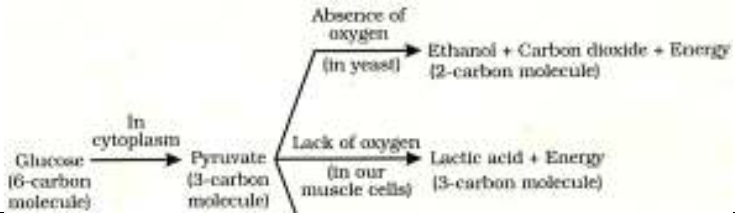
**General Instructions: -**

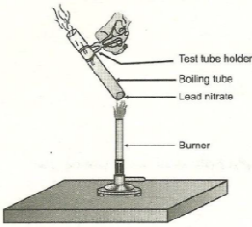
1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully. **Evaluation is a 10-12 days mission for all of us. Hence, it is necessary that you put in your best efforts in this process.**
2. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them.**
3. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled.
5. If a question does not have any parts, marks must be awarded in the left hand margin and encircled.
6. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
7. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
8. A full scale of marks 1 to 80 has to be used. Please do not hesitate to award full marks if the answer deserves it.
9. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 25 answer books per day.
10. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
  - Leaving answer or part thereof unassessed in an answer book.
  - Giving more marks for an answer than assigned to it.
  - Wrong transfer of marks from the inside pages of the answer book to the title page.
  - Wrong question wise totaling on the title page.
  - Wrong totaling of marks of the two columns on the title page.
  - Wrong grand total.
  - Marks in words and figures not tallying.
  - Wrong transfer of marks from the answer book to online award list.
  - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
  - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
11. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as (X) and awarded zero (0) Marks.
12. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
13. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
14. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
15. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.



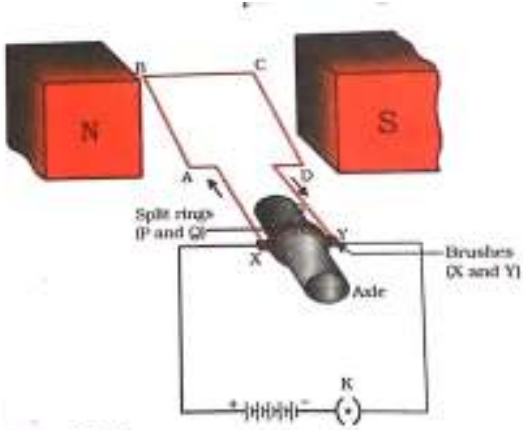
	<p>undergoes continuous refraction before it reaches the earth.</p> <ul style="list-style-type: none"> <li>The since the atmosphere bends starlight towards the normal, the apparent position to the star is slightly different from its actual position.</li> </ul>  <p>Diagram with Correct labeling</p> <p>OR</p> <p>(i) If the student cannot see the words written on the black board then he is considered myopic.</p> <p>(ii) The defect may arise due to</p> <ol style="list-style-type: none"> <li>Excessive curvature of the eyeball</li> <li>Elongation of the eyeball</li> </ol> <p>(iii)</p>  <p>(c) Correction for myopia</p>	<p><math>\frac{1}{2}</math></p> <p><math>1\frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2} \times 2</math></p> <p>1</p>	<p>3</p>									
9	<ul style="list-style-type: none"> <li><math>\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}</math></li> <li><math>2\text{NaHCO}_3 \xrightarrow{\text{Heat}} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2</math> / by heating (Baking Soda) (Sodium Carbonate)</li> <li><math>(\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O} \longrightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O})</math> (Sodium Carbonate) (Washing Soda)</li> </ul> <p>Uses</p> <ul style="list-style-type: none"> <li>In Glass, Soap and Paper Industry</li> </ul> <p>(any two)</p>	<p>1</p> <p>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p>	<p>3</p>									
10	<table border="1"> <thead> <tr> <th>Activity</th> <th>Observation</th> <th>Inference</th> </tr> </thead> <tbody> <tr> <td>Put metal R in the sulphate solution of metal Q and P</td> <td>Solution becomes colourless in both the test tubes.</td> <td>R displaces P and Q ions from their solutions.</td> </tr> <tr> <td>Put metal P in the solution of sulphate ions of metal Q</td> <td>No reaction</td> <td>P cannot displace Q ions from the solution</td> </tr> </tbody> </table>	Activity	Observation	Inference	Put metal R in the sulphate solution of metal Q and P	Solution becomes colourless in both the test tubes.	R displaces P and Q ions from their solutions.	Put metal P in the solution of sulphate ions of metal Q	No reaction	P cannot displace Q ions from the solution	<p>1</p> <p>1</p>	
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	<p style="text-align: center;">So the <math>P &lt; Q &lt; R</math> (From activity to inference award 1 mark) OR</p> <p>Cinnabar / (HgS)</p> $2\text{HgS} + 3\text{O}_2 \rightarrow 2\text{HgO} + 2\text{SO}_2$ $2\text{HgO} \xrightarrow{\Delta} 2\text{Hg(l)} + \text{O}_2$ <p>(Complete process explained in the form of sentence full credit may be given.)</p>	<p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>	3
11	<p>An element's valency is determined by the number of electrons in its outer most shell.</p> <p>Electronic configuration: Atomic No. = 15 Electronic configuration of element X = 2,8, 5 Valency of Element X = <math>8 - 5 = 3</math> Hence the valency of element X is 3.</p>	<p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>	3
12.	<ul style="list-style-type: none"> <li>• Respirator Pigment responsible for <math>\text{O}_2</math> transport.</li> </ul> <p>Consequences:</p> <ul style="list-style-type: none"> <li>- Can affect the <math>\text{O}_2</math> supplying capacity of blood to the tissues</li> <li>- Causes anaemia .</li> </ul>	<p style="text-align: center;">1</p> <p style="text-align: center;">1 + 1</p>	3
13	<p>a) Speciation: It refers to the process by which new species are formed from the pre-existing species</p> <ol style="list-style-type: none"> <li>i) Geographical isolation</li> <li>ii) Genetic drift</li> <li>iii) Natural selection</li> </ol> <p>(b) Natural selection is the process by which organisms having some special features are at an advantage for better survival in the changed environment. (Or explanation with the help of the any example)</p> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• <math>F_1</math> generation – all plants with round seeds</li> <li>• <math>F_2</math> generation – plants with round and wrinkled seeds.</li> <li>• Tall / dwarf plants Yellow / green seeds White / purple flowers</li> </ul> <p style="text-align: right;">(any two)</p>	<p style="text-align: center;">1</p> <p style="text-align: center;"><math>\frac{1}{2}</math></p> <p style="text-align: center;"><math>1\frac{1}{2}</math></p> <p style="text-align: center;">1</p> <p style="text-align: center;"><math>\frac{1}{2} + \frac{1}{2}</math></p> <p style="text-align: center;"><math>\frac{1}{2} + \frac{1}{2}</math></p>	3
14	<p>The first step in the breakdown of glucose. Glucose is converted to pyruvate.</p> <ul style="list-style-type: none"> <li>- Pyruvate in the absence of <math>\text{O}_2</math> may be converted to ethanol, <math>\text{CO}_2</math> and energy</li> <li>- Pyruvate in the shortage of <math>\text{O}_2</math> may be converted to lactic acid and energy.</li> </ul> <p style="text-align: center;">OR</p>	<p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>	

					3								
15	<b>Cerebrum</b> 1) It is a part of fore brain 2) It initiates intelligence, memory, voluntary movements etc., 3) Main thinking part of the brain.	<b>Cerebellum</b> 1) It is a part of hind brain 2) It maintains posture and equilibrium 3) Controls voluntary actions like walking in a straight line, picking up a pencil, riding a bicycle etc.		$\frac{1}{2} + \frac{1}{2}$  $\frac{1}{2} + \frac{1}{2}$  $\frac{1}{2} + \frac{1}{2}$	3								
16	(a) • Carbon compounds containing only carbon and hydrogen are called hydrocarbons Example: Alkane / Alkene / Alkyne / any other <b>(any one)</b> (b) <table border="1" data-bbox="365 1029 1023 1501"> <thead> <tr> <th>Saturated Hydrocarbons</th> <th>Unsaturated Hydrocarbons</th> </tr> </thead> <tbody> <tr> <td>Consists of Only Single Bonds</td> <td>Consists of Double and Triple bonds</td> </tr> <tr> <td> <math display="block">\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}</math>           Ethane         </td> <td> <math display="block">\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}=\text{C}-\text{H} \end{array}</math>           Ethene         </td> </tr> <tr> <td> <math display="block">\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\   \quad   \quad   \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\   \quad   \quad   \\ \text{H} \quad \text{H} \quad \text{H} \end{array}</math>           Propane         </td> <td> <math display="block">\text{H}-\text{C}\equiv\text{C}-\text{H}</math>           Ethyne         </td> </tr> </tbody> </table>		Saturated Hydrocarbons	Unsaturated Hydrocarbons	Consists of Only Single Bonds	Consists of Double and Triple bonds	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$ Ethane	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}=\text{C}-\text{H} \end{array}$ Ethene	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\   \quad   \quad   \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\   \quad   \quad   \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$ Propane	$\text{H}-\text{C}\equiv\text{C}-\text{H}$ Ethyne		$\frac{1}{2}$  $\frac{1}{2}$  2	
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	(c) (i) $\text{CH}_3 - \text{OH}$ Methanol / Methyl alcohol (ii) $\text{CH}_3 - \overset{\text{H}}{\underset{\text{O}}{\text{C}}}$ Ethanal / Acetaldehyde (iii) $\text{CH}_3 - \overset{\text{O}}{\parallel} - \text{CH}_3$ Propanone / acetone												

	<p>(iv) <math>\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{OH}</math> Ethanoic Acid / Acetic acid</p>	$\frac{1}{2} \times 4$	5
17	<p>(a) Exchange of ions in a reaction between two. (b) <math>\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \longrightarrow \text{BaSO}_4 + 2 \text{NaCl}</math></p> <p>(If the answer is descriptive form award marks)</p> <p>(b) (i) Combination reaction: A combination reaction is a reaction where two or more elements or compounds combine to form a single compound.</p> <p>(ii) <math>\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2</math> Quick lime                  Calcium Hydroxide\</p> <p>Chemical name of the product formed - (calcium hydroxide (slaked lime))</p> <p>(iii) Observations of the reactions: - Reaction takes place vigorously - Large amount of heat is released.</p> <p style="text-align: center;">OR</p> <p>(a) Activity : Take a pinch of lead nitrate powder in a test tube. Heat it over the flame.</p> <div style="text-align: center;">  </div> <p>( <math>\frac{1}{2}</math> marks for labeling)</p> <p>(b) Observation :</p> <ul style="list-style-type: none"> <li>• Emission of brown fumes observed</li> <li>• Reddish brown colour of residue (any one)</li> </ul> <p>(c)</p> $2\text{Pb(NO}_3)_2(s) \xrightarrow{\text{Heat}} 2\text{PbO}(s) + 4\text{NO}_2(g) + \text{O}_2(g)$ <p style="text-align: center;">Lead nitrate                  Lead oxide                  Nitrogen dioxide                  Oxygen</p>	<p>1</p> <p>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p>1</p> <p>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p>1+1</p>	5
18	<p>(a)</p> <ul style="list-style-type: none"> <li>• Virtual</li> <li>• Erect</li> <li>• Diminished</li> <li>• On the same side of the object</li> </ul> <p>(b) Focal Length = 20cm. <math>u = -x \text{ cm}</math></p>	<p><math>\frac{1}{2} \times 4</math></p> <p>1</p>	

	$v = \frac{x}{\frac{3}{3}}$ $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ <p><math>x = 80 \text{ cm}</math></p>	1	
		1	5
19	<p>(a)</p> <ul style="list-style-type: none"> <li>In series - <math>R_S = R_1 + R_2 + R_3</math>.</li> <li>In parallel - <math>\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}</math></li> </ul> <p>Resistance is at minimum - <math>\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}</math></p> $\frac{1}{12} + \frac{1}{12} = \frac{2}{12} = 6\Omega$ <p>Resistance is maximum - <math>R_S = R_1 + R_2</math></p> $R_S = 12 + 12 = 24 \Omega$ $P = \frac{v^2}{R}$ <p>Power ration in parallel and series = 4:1</p> <p>(b) <math>\frac{P_{\min}}{P_{\max}} = \frac{V^2 / R_{\min}}{V^2 / R_{\max}} = \frac{R_{\max}}{R_{\min}} = \frac{24}{6} = \frac{4}{1}</math></p> <p>OR</p> <p>(a)</p> $R \propto l$ $R \propto \frac{1}{A}$ $R \propto \frac{l}{A}$ $R = \rho \frac{l}{A}$ $\rho = \frac{RA}{l} = \frac{\text{ohm} \times m^2}{m}$ $= \text{ohm} \times m$ <p>(b)</p> $\rho = \frac{RA}{l}$	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p> <p>1</p> <p>2</p> <p><math>\frac{1}{2} \times 6</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	

	$= \frac{100 \times 3 \times 10^{-7}}{5}$ $= 60 \times 10^{-7} \text{ ohm} \times m$	1	5								
20	<p>(a)</p> <ul style="list-style-type: none"> <li>The rule is Fleming's left hand rule.</li> <li>If the finger points in the direction of the magnetic field and the second finger in the direction of the magnetic field and the second finger in the direction of current then the thumb will point in the direction of motion or the force acting on the conductor</li> </ul> <p>(b) Electric motor.</p> 	1 2	5								
21	<p>a) <b>Reproduction-</b> The process of producing ofsprings / young ones of its own kind.</p> <p>Types:</p> <p>i) Asexual</p> <p>ii) Sexual</p> <p>b)</p> <table border="1" data-bbox="370 1543 1128 1852"> <thead> <tr> <th>Unicellular Organisms</th> <th>Multicellular Organisms</th> </tr> </thead> <tbody> <tr> <td>1) Only one parent is required</td> <td>Two parents are required</td> </tr> <tr> <td>2) It is a fast process of reproduction.</td> <td>Slower process of reproduction than in unicellular organism</td> </tr> <tr> <td>3) No specialized cells are required for reproduction.</td> <td>Specialized cells are required for reproduction.</td> </tr> </tbody> </table> <p style="text-align: right;">(Any two points)</p> <p style="text-align: center;"><b>OR</b></p> <p>a) STD- A disease that can be transmitted through sexual contact.</p>	Unicellular Organisms	Multicellular Organisms	1) Only one parent is required	Two parents are required	2) It is a fast process of reproduction.	Slower process of reproduction than in unicellular organism	3) No specialized cells are required for reproduction.	Specialized cells are required for reproduction.	1  1 1  1 1	5
Unicellular Organisms	Multicellular Organisms										
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	<ul style="list-style-type: none"> <li>• Viral – i) Warts ii) AIDS</li> <li>• Bacterial- i) Gonorrhoea ii) Syphilis</li> </ul> <p>b) Contraception: The method of preventing unwanted pregnancies, Reasons –</p> <p>i) To prevent unwanted pregnancies ii) To control population rise / birth rate iii) To prevent transfer of STD's iv) Proper gap between successive births v) For the better health of mother</p> <p style="text-align: right;">(Any three)</p>	<p>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2} \times 3</math></p>	5
22	<p>a) Saffranin is used to stain the material for better view. b) Glycerine is used to avoid drying of peel.</p> <p style="text-align: center;">OR</p> <p>i) Take a thin peel of leaf on a glass slide. ii) Stain it with saffranin iii) Remove extra stain iv) Put a drop of glycerin and cover it with cover slip</p>	<p>1</p> <p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	2
23	<p>i) Conical flask is not air tight. ii) Freshly prepared solution of KOH not used. iii) Germinating seeds may be dry.</p> <p style="text-align: right;">(any two)</p>	1+1	2
24	<p>a) 0.15V is the least count b) The reading shown is 1.8V c) <math>R = 20\Omega</math> <math>V=1.8V</math> <math>I = \frac{V}{R} = \frac{1.8}{20} = .09amp</math></p>	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p>	2
25	<p>i. Fix a concave mirror on a stand and place it near a source of bright light ii. Place a screen fitted on a stand in front of the mirror iii. Move the screen back and forth, until a sharp and clear image of a distance object like a tree is obtained on the screen iv. Mark the position of mirror and screen on the scale and note the distance between them</p> <p style="text-align: center;">OR</p> <p>The student should take the following precaution</p> <p>(a) Precaution -</p> <p>(i) See that the pins are in a straight line and at least 3cm apart. (ii) Angle of incidence should be between <math>30^\circ</math> to <math>60^\circ</math>. (iii) Glass slab should always remain inside the boundary.</p> <p style="text-align: right;">(any two)</p> <p>(b) Conclusion -</p> <p>(i) The emergent ray is parallel to incident ray (ii) Lateral displacement takes place. (iii) Angle of incidence = Angle of emergence</p> <p style="text-align: right;">(any two)</p>	<p><math>\frac{1}{2} \times 4</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	2
26	Ethanoic acid		

	a) Odour – it smells like vinegar b) It is soluble in water c) Blue litmus to red d) $\text{NaHCO}_3 + \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
27	<ul style="list-style-type: none"> <li>• Putting Cu strips in <math>\text{FeSO}_4</math> --- no reaction</li> <li>• Putting Al strips in <math>\text{FeSO}_4</math> -- change in colour observed</li> <li>• Displacement reaction</li> <li>• <math>\text{Al} + \text{FeSO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{Fe}</math> (OR)</li> </ul> 1) Do not point the mouth of boiling tube at your neighbours or yourself / point the test tube away from the body 2) Hold the test tube in inclined position 3) Hold the test tube with Tongs (Any two)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$   1+1	2