



secondary school  
**SEMBAWANG**

**WSA-EC**

**SCIENCE DEPARTMENT**



## Topic of Choice

Topic: Chemical Bonds

Lesson objective: Students are expected to relate **physical properties** of substances to their **structure** and **bonding**.



## Area of Concern

(b) Explain why ammonium sulfate is able to conduct electricity only when in molten state or dissolved in water but not in solid state.

This is because ammonium sulfate is bond by ionic bonding.

Hence, in ~~the~~ molten state or dissolved in water, the

electrons would be able to move about. Therefore it can conduct electricity.

Many students are not able to gain full credit for these type of questions as they lack the language needed for organising concepts.

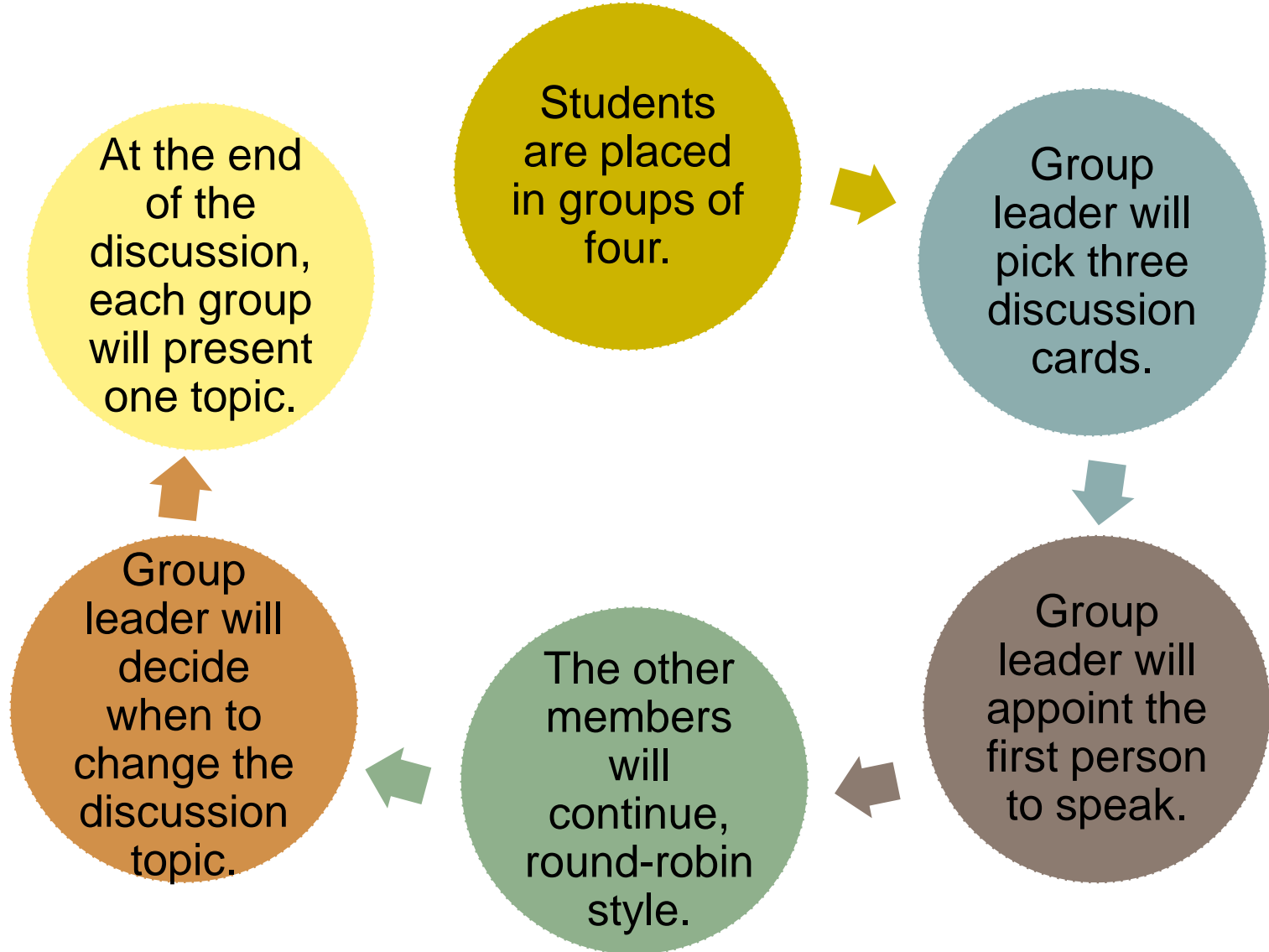


## Objective of Lesson

- Increase the use effective and collaborative talk.
- Allows learners to explore and clarify concepts.
  - Respond to others' ideas.
  - Make logical deductions.
  - Deepen students' reasoning.
  - Provide a systematic way of organizing ideas.



## Lesson Outline





## Discussion Cards

1 Use your knowledge of the bonding in magnesium chloride and hydrogen chloride to explain the difference in boiling point.

2 Explain why graphite is able to conduct electricity.

3 Explain why sodium chloride is able to conduct electricity when molten but when allowed to solidify, it loses the ability to conduct electricity.

4 Explain why sodium chloride crystals are very hard.

5 Relate the structure of tungsten to its ability to conduct electricity.

6 Explain why potassium oxide has a high melting and boiling point.

7 Explain, in terms of its structure, why graphite can act as a lubricant.

8 Explain, using ideas about structure, why carbon dioxide and silicon dioxide have different melting points.

9 Explain why ionic compounds are soluble in water but insoluble in organic solvents.

10 Relate the lattice structure of potassium chloride to its ability to conduct electricity.

Use your knowledge of the bonding in magnesium chloride and hydrogen chloride to explain the difference in boiling point.



## Example

Stem of sentence:

**For instance,....**

Example of how a stem of sentence is used:

Ionic compounds, **for instance**, sodium chloride are generally soluble in water.



## Stems of Sentences

- Firstly, ..... Secondly, ..... Lastly, .....
- In other words, .....
- The effect of this .....
- This, in turn, causes .....
- For instance, .....
- As a result .....
- Adding on to that, .....
- I conclude that .....





## Example

Describe the formation of the ionic bond in sodium chloride.

- Student A: Firstly, sodium atom loses an electron to achieve a noble gas structure. Secondly, chlorine atom gains an electron to achieve a noble gas structure.
- Student B: As a result,  $\text{Na}^+$  and  $\text{Cl}^-$  ions are formed.
- Student C: The effect of this is strong electrostatic forces of attraction formed between the oppositely charged ions.
- Student D: Adding on to that, the formula of sodium chloride will therefore be  $\text{NaCl}$ .



## Group Discussion



Students were given 20 minutes for the discussion.



## Potential Challenges

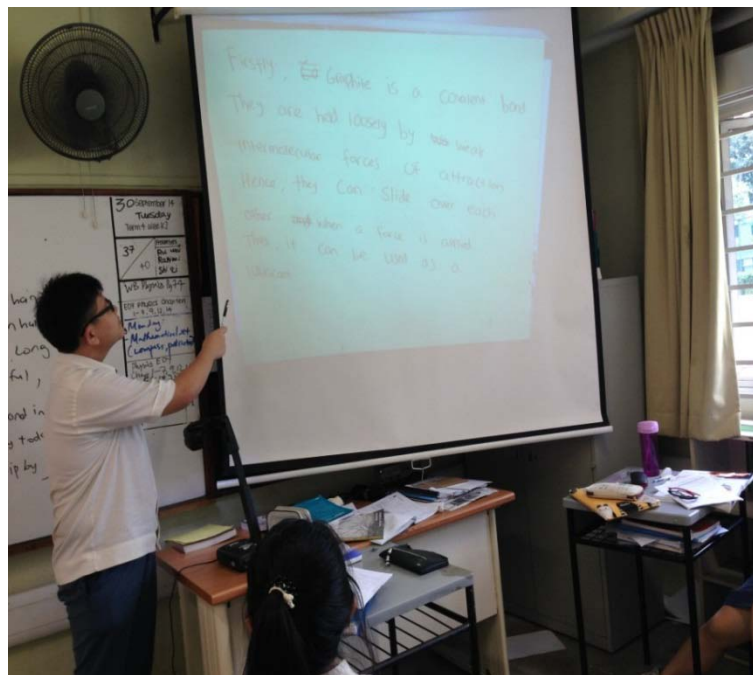
- Weaker students faced difficulty articulating their thoughts.
- Students require a great deal of wait time.

## Solutions

- Students given the autonomy to form their own groups.
- Sufficient time to be given for the discussion.



## Presentation



- Expose the students to the other discussion topics.
- Students to critique their classmates' answers.



## Measuring Change in Learning

- Quiz at the end of the lesson.  
Positive correlation between the lesson and the students' results.
- End of the year examination.  
Less significant improvement in the quality of answers given.



## Students' Feedback

- I **learnt from my friends** how to give a complete answer.
- Through this activity, I am now **clearer** about how physical properties is linked to bonding.
- I am now **more conscious** of the words to use to answer questions.



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**Thank You**