CHEMISTRY YEAR 11 - MODULE 4 - LESSON 12

📊 Calculating ΔS° & Standard Entropy

Use this worksheet after reading the lesson to practise the key ideas and prove you can meet the success criteria.

Name _____

Date _____

Class _____

1. Key Ideas

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- Key facts and terms for 📊 Calculating ΔS° & Standard Entropy
- How the main ideas in 📊 Calculating ΔS° & Standard Entropy connect

2. Success Criteria

By the end, you should be able to:

- Key facts and terms for 📊 Calculating ΔS° & Standard Entropy
- Where this lesson fits in Module 4
- How the main ideas in 📊 Calculating ΔS° & Standard Entropy connect

3. Key Terms

standard entropy (S°)
A measure of the disorder or randomness of a system and its surroundings.

Enthalpy change (ΔH)
The heat energy exchanged at constant pressure during a reaction.

Exothermic
A reaction releasing heat to surroundings (ΔH < 0).

Endothermic
A reaction absorbing heat from surroundings (ΔH > 0).

Calorimetry
The experimental measurement of heat changes during chemical processes.

Hess's Law
The total enthalpy change is independent of the pathway taken.

4. Activity: Build the Lesson Map

Use the lesson to complete the table. Keep answers brief but specific.

Prompt	Your answer
Main concept	
Important example	
Common mistake to avoid	
How this links to the next lesson	

5. Short Answer Questions

1. Q6 (4 marks) Explain the Third Law of Thermodynamics and why it allows us to tabulate absolute entropy values (S°) for all substances. In your answer, explain why S°(elements) ≠ 0, unlike ΔHf° (elements) = 0.

BAND 3 4 MARKS

2. Q7 (5 marks) Calculate ΔS° for the formation of ammonia: $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \to 2\text{NH}_3\text{(g)}$. Then convert ΔS° to kJ K^{-1} mol^{-1} and explain when this conversion is necessary. Use: S°[N_2(g)] = 191.6, S°[H_2(g)] = 130.7, S°[NH_3(g)] = 192.4 J K^{-1} mol^{-1}.

BAND 4 5 MARKS

3. Q8 (6 marks) The combustion of methane is: $\text{CH}_4\text{(g)} + 2\text{O}_2\text{(g)} \to \text{CO}_2\text{(g)} + 2\text{H}_2\text{O(l)}$. ΔH° = −890 kJ mol^{-1}. Using the data table from Activity 1, calculate ΔS° for this reaction. Then determine ΔG° at 25°C (298 K) and comment on whether the reaction is spontaneous at this temperature. Show all working and unit conversions.

BAND 5 6 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about 📊 Calculating ΔS° & Standard Entropy but does not use evidence or reasoning.

Improve the answer by writing a stronger response that uses accurate terminology, a relevant example and a clear explanation.

7. Multiple Choice

1. What is the best first step when answering a question about 📊 Calculating ΔS° & Standard Entropy?

☐ A. Identify the key concept being tested

☐ B. Write every fact from memory

☐ C. Ignore the command word

☐ D. Skip examples and evidence

2. Which answer would show stronger understanding of 📊 Calculating ΔS° & Standard Entropy?

☐ A. An answer with accurate terms and reasoning

☐ B. A copied definition only

☐ C. A single-word response

☐ D. An answer with no example

3. What should you do if a question asks you to explain?

☐ A. Link the idea to a reason or cause

☐ B. List unrelated facts

☐ C. Only draw a diagram

☐ D. Write the shortest possible answer

8. Success Criteria Proof

Finish with evidence that you can do each success criterion.

SUCCESS CRITERION 1

Prove that you can: Key facts and terms for 📊 Calculating ΔS° & Standard Entropy

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: Where this lesson fits in Module 4

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: How the main ideas in 📊 Calculating ΔS° & Standard Entropy connect

BAND 5 4 MARKS

One thing I still need help with: