

Spaced Retrieval Practice in Introductory Chemistry Courses

Queen's Chemistry Education Research (QCER) Team

Welcome!

This short activity is designed to help you strengthen your understanding of foundational chemistry concepts through quick, focused practice sessions.

Your participation not only supports your own learning but also contributes to ongoing research by the Queen's Chemistry Education Research (QCER) Team, who are exploring better ways to help students succeed in chemistry.

How Your Flashcard Session Will Work

- Step 1: Start the session

You'll begin by entering your student number and selecting the current week of study. Once you have done that, you can click "Begin" to start.

CHEM 112 Weekly Flashcards

Answer the questions for your current week. You'll see feedback after each response and re-attempt missed items until mastery.

Start

Student Number (8 digits)

Week

Begin

Tip: press **Enter** to start.

- Step 2: Prediction question

You'll be asked to predict how many questions you think you'll get correct. This helps you reflect on your confidence and awareness of your own learning.

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Before You Start

You are going to be asked 10 questions about IUPAC nomenclature.

Predict how many you will get correct (1–10).

1 2 3 4 5 6 7 8 9 10

Have you read the instructions yet? (optional)

Show instructions

Continue

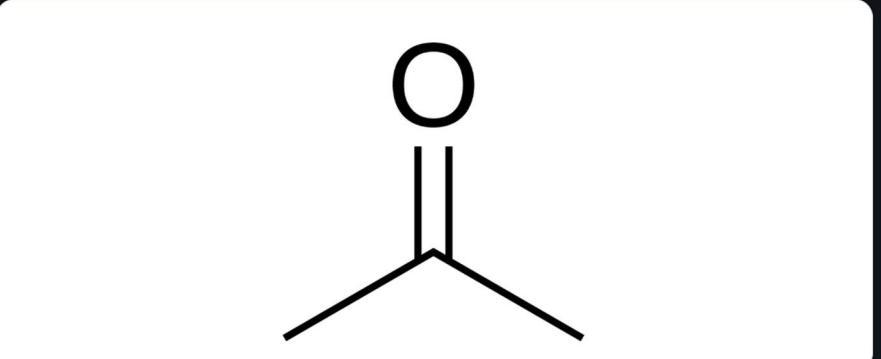
Press **Enter** to continue.

- Step 3: Answer the questions

You'll see a variety of IUPAC naming questions where you can type in your answer. Press Enter or click Submit when you feel confident!

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propan-____-one

Fill in the Blank

Type your answer

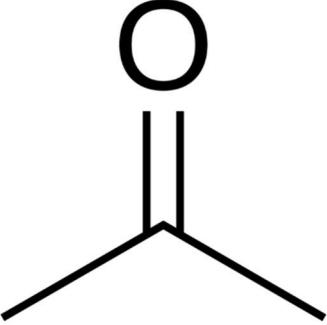
Submit

- Step 4: Feedback

After submitting, you'll see right away whether your answer was correct. Try to recall why it's right (or where you went wrong). After 5 seconds, the next question will pop up.

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propan-2-one

Fill in the Blank

2

Correct 🎉

Continuing in 3...

Your answer: 2 Correct answer: 2

- Step 5: Reattempts (if any)

The questions that were answered incorrectly on your first attempt will reappear later. It is in your best interest to try and give the correct answer, as it will loop until you have “mastered” that question.

- Step 6: Completion screen

When you've completed all your flashcards, you'll see a final message that says "Flashcards Complete!"

The screenshot shows a dark-themed mobile application interface. At the top, the title "CHEM 112 Weekly Flashcards" is displayed in white, bold letters next to a small icon of three cards. Below the title, a descriptive text reads: "Answer the questions for your current week. You'll see feedback after each response and re-attempt missed items until mastery." In the center, a large white box contains the message "Flashcards complete!" in bold black font, accompanied by a small confetti icon. Below this message, a smaller text says "Thank you for your participation!". To the right of the message box, there are two buttons: "Check/Retry Upload" and "Upload recorded (or already exists)".

After completing your flashcards session, your responses are automatically uploaded to a secure server. If the message says that an upload error occurred, it is most likely due to a poor internet connection. You can click the Check/Retry upload button to verify that the upload has worked and will be brought to a final thank you screen.

No personal data will be collected, as the research team is focused on your response time and accuracy of your responses. Don't worry, these practice sessions are not for marks, they are meant purely for your benefit!

If you encounter any issues, please contact Josh Maligaya (joshua.maligaya@queensu.ca) for assistance.

Thank You for Participating!

Your participation helps us better understand how students learn chemistry, and how we can make that learning more engaging and effective for everyone.

Even a few short review sessions like this can make a big difference in long-term learning. We encourage you to continue using spaced retrieval throughout the term; it's one of the most powerful (and research-backed) ways to retain what you've learned.

For the Curious: What Is Spaced Retrieval Practice?

Spaced Retrieval Practice combines two key learning strategies:

- Retrieval practice: Actively recalling information from memory strengthens it and helps you spot what you truly understand.
- Spacing effect: Reviewing information after short breaks (instead of cramming) helps your brain build durable, long-term memories.

When used together, they create *effortful retrieval*, which is a challenge that leads to real, lasting learning. Research shows that students who use spaced retrieval practice remember more, feel more confident, and perform better on later assessments.

 TL;DR: The more often you recall information (not just reread it), and the more you space out that practice, the stronger and longer lasting your learning becomes.