

MultiTool-CoT: GPT-3 Can Use Multiple External Tools with Chain of Thought Prompting

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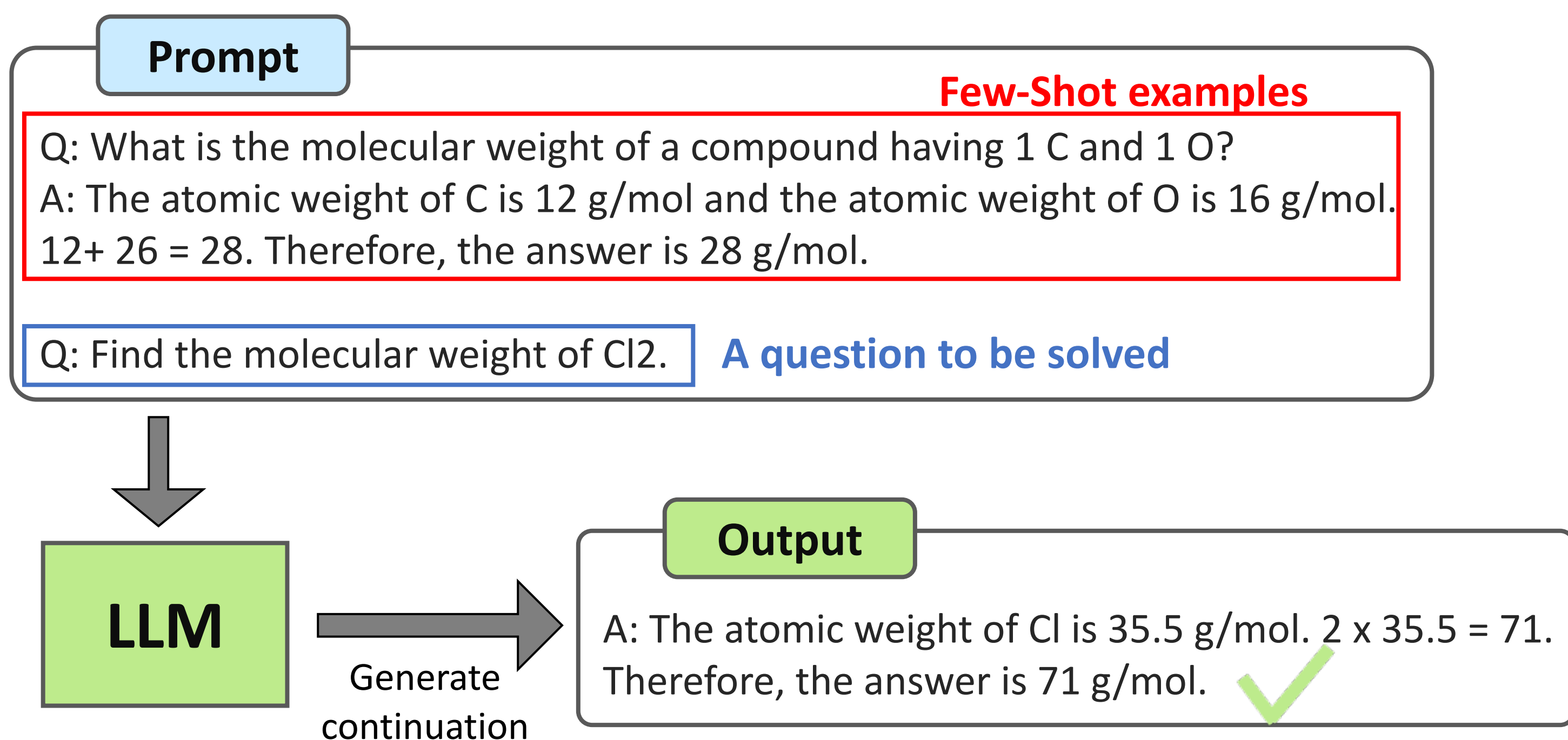


Abstract

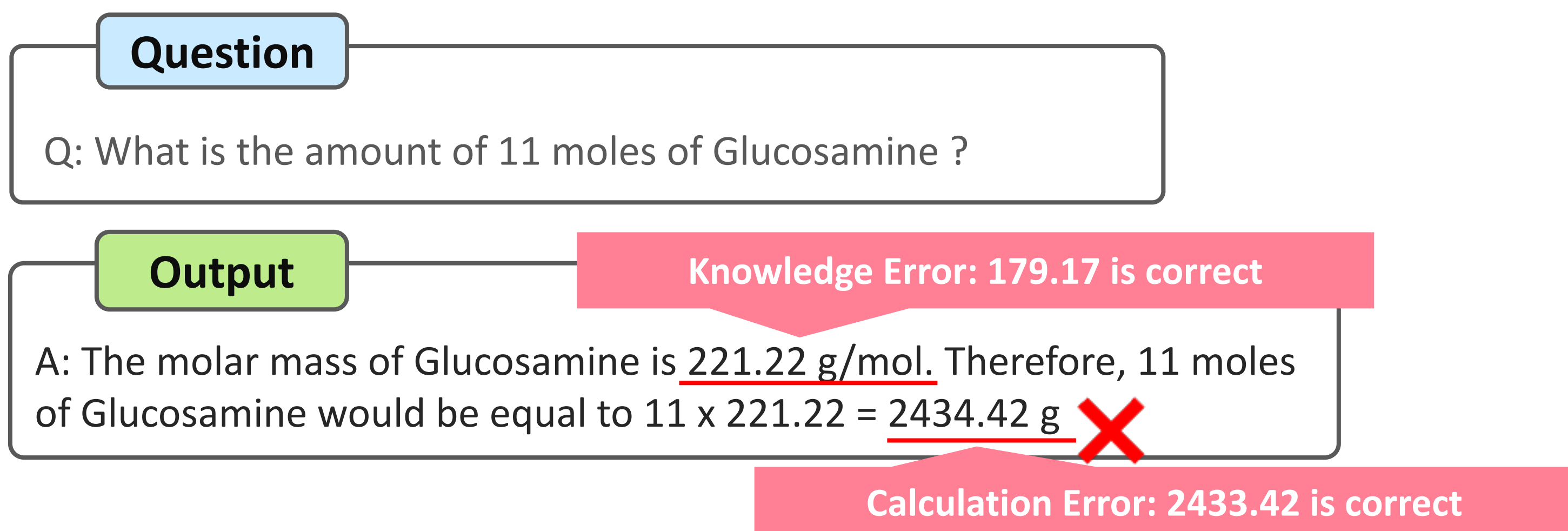
- We proposed **MultiTool-CoT**, a novel framework that allows LLMs to use multiple external tools during reasoning.
- MultiTool-CoT** achieved SOTA on NumGLUE Task2 which requires numerical reasoning and domain-specific knowledge.

Background: Reasoning with LLMs

- In reasoning tasks, chain-of-thought (CoT) prompting is known to be effective. [Wei+, 2022]



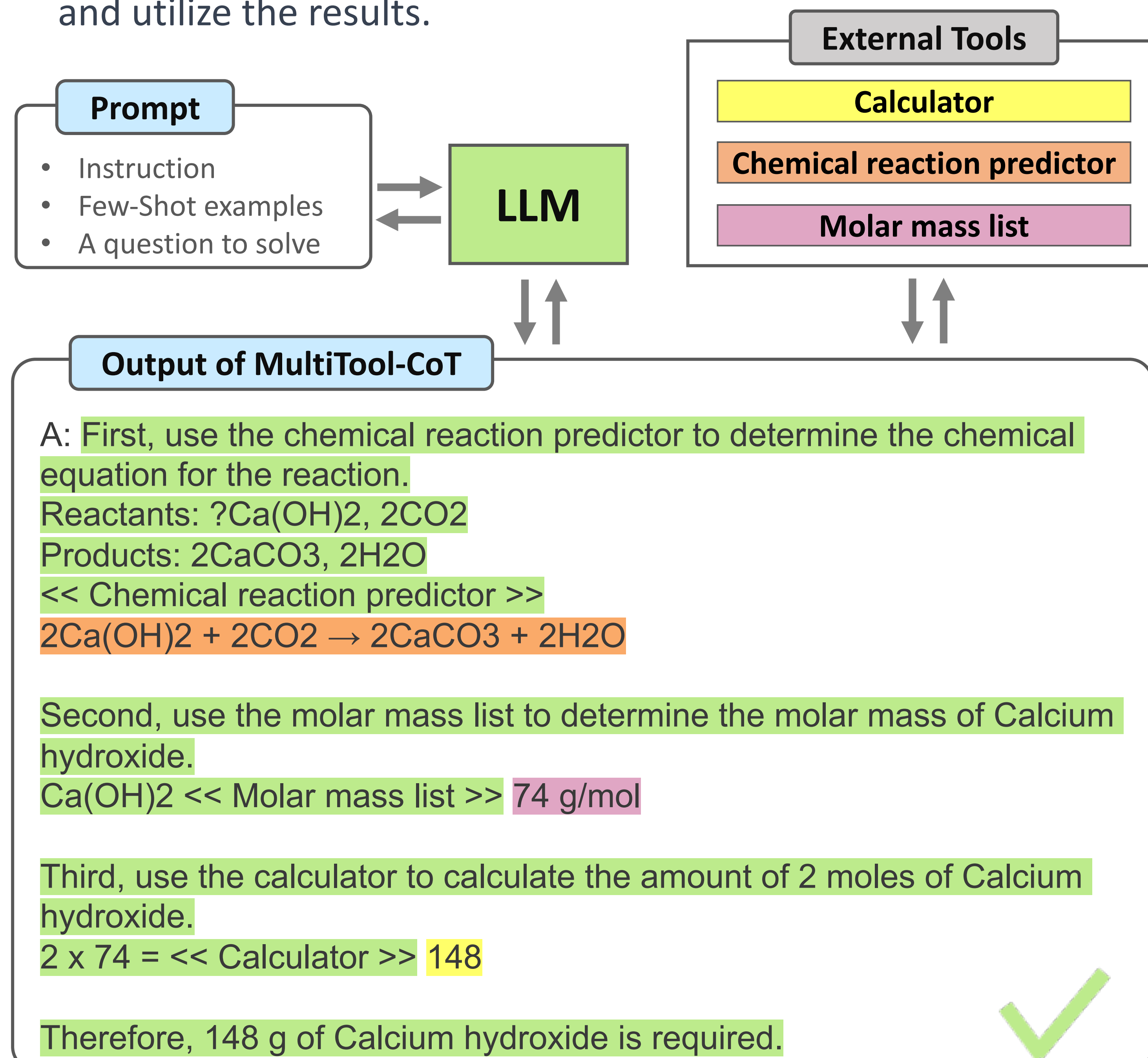
Motivation: Complement LLM's Capabilities



- To answer correctly, one needs to address these problems together.
- Previous studies are insufficient to solve such questions because they focused on complementing a single capability [Cobbe+, 2021].

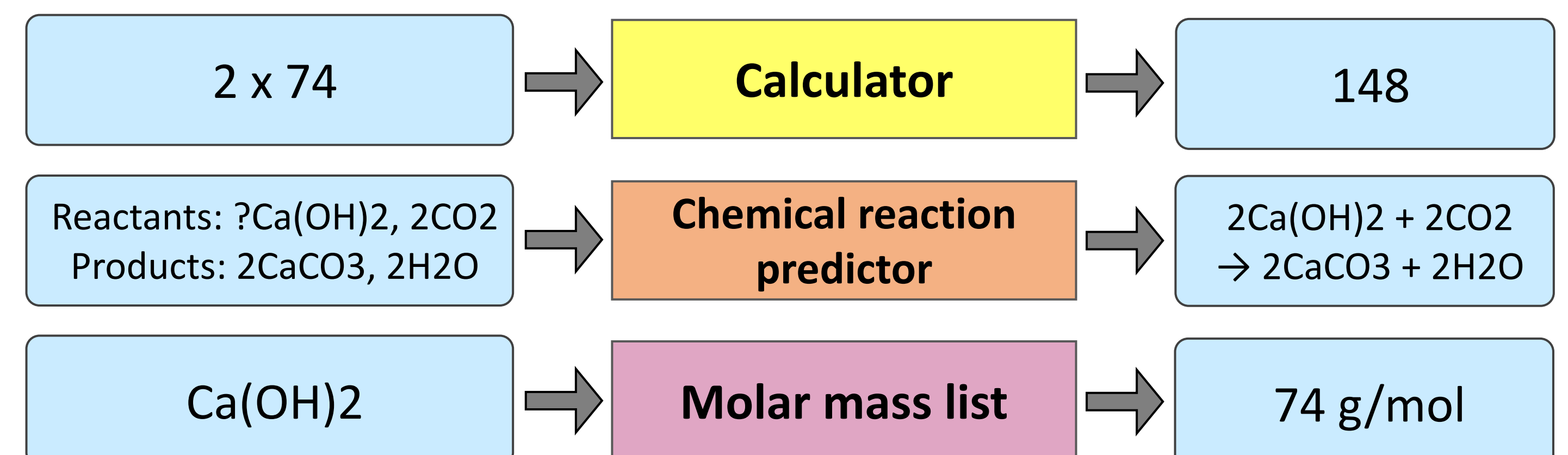
Proposed Method: MultiTool-CoT

- LLMs invoke external tools at the appropriate reasoning steps and utilize the results.

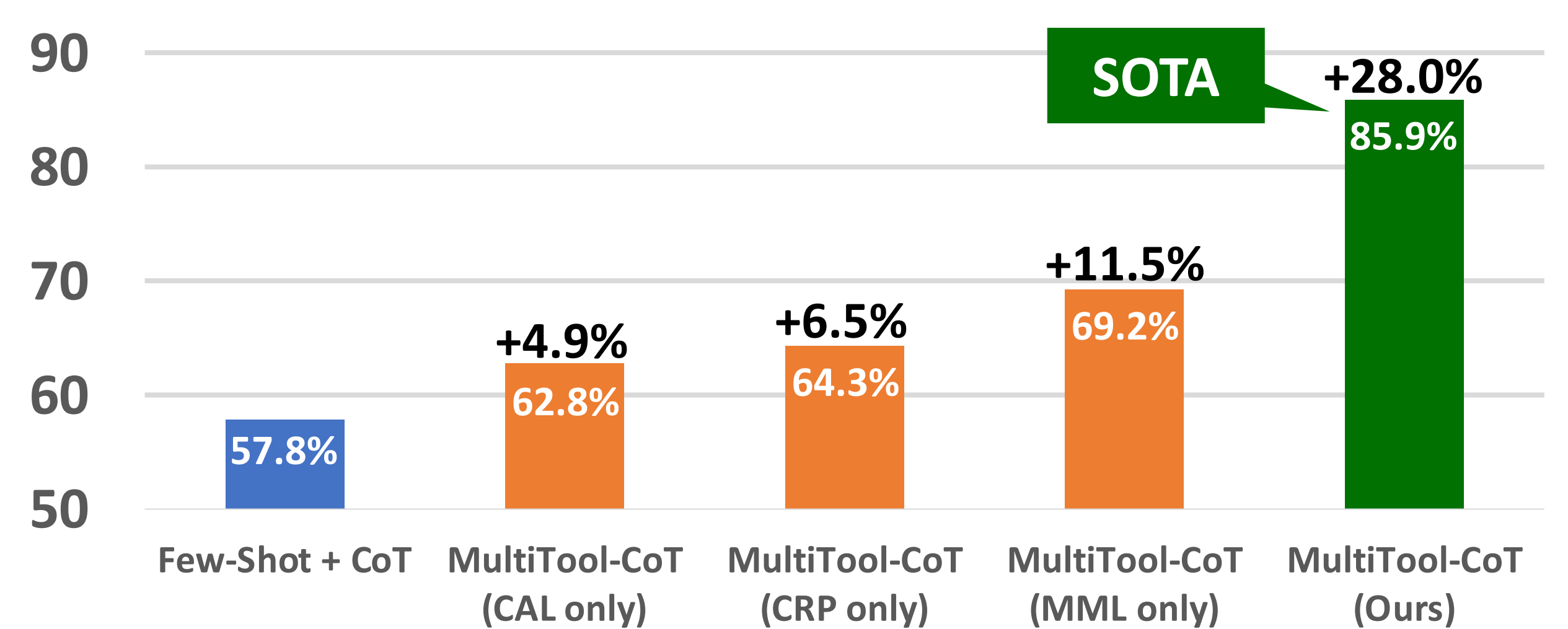


Experiment: NumGLUE Task2 [Mishra+, 2022]

- Dataset: NumGLUE Task2, which requires numerical reasoning and domain-specific knowledge, predominantly in chemistry
- LLM: GPT-3 (text-davinci-003)
- External Tools: The following 3 tools

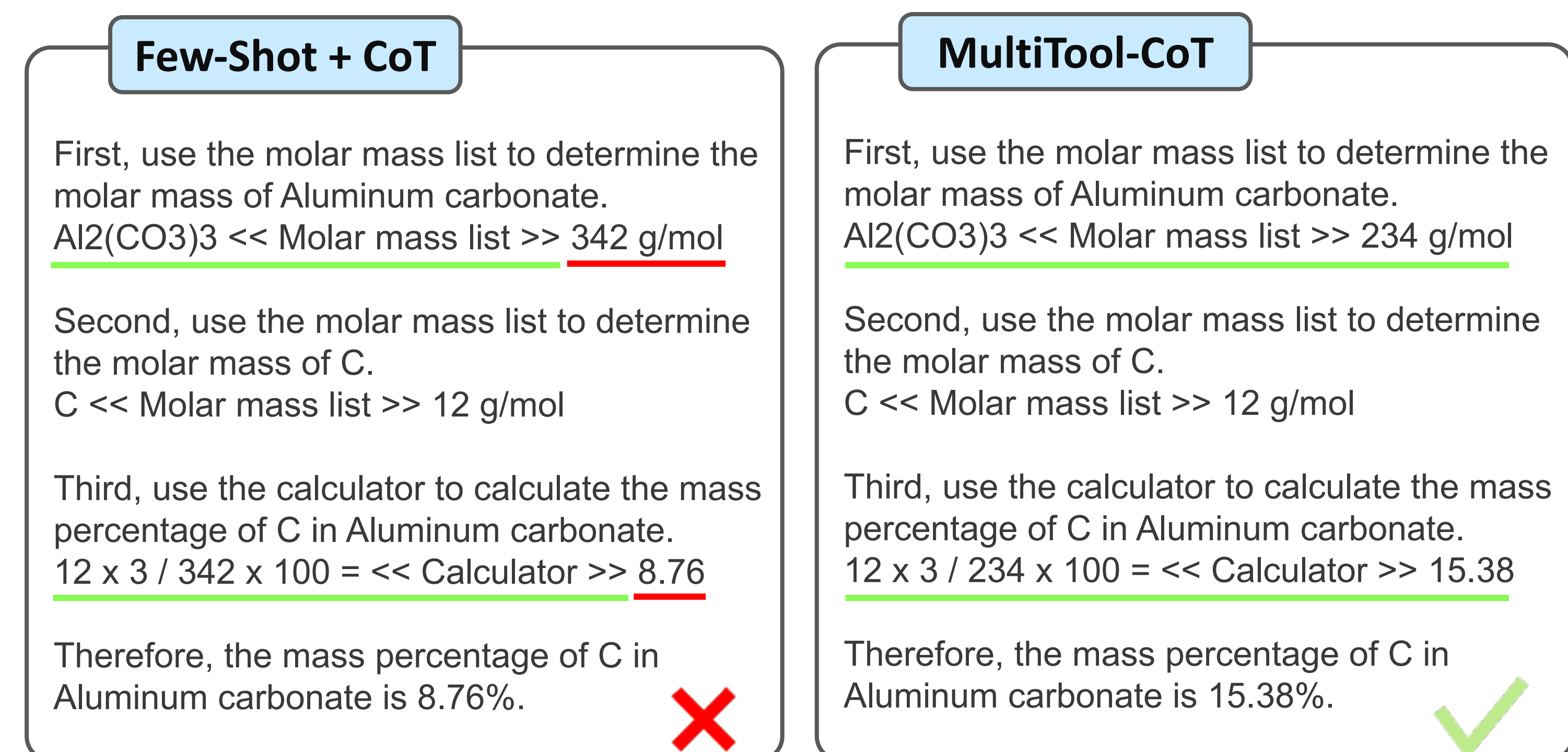


Results



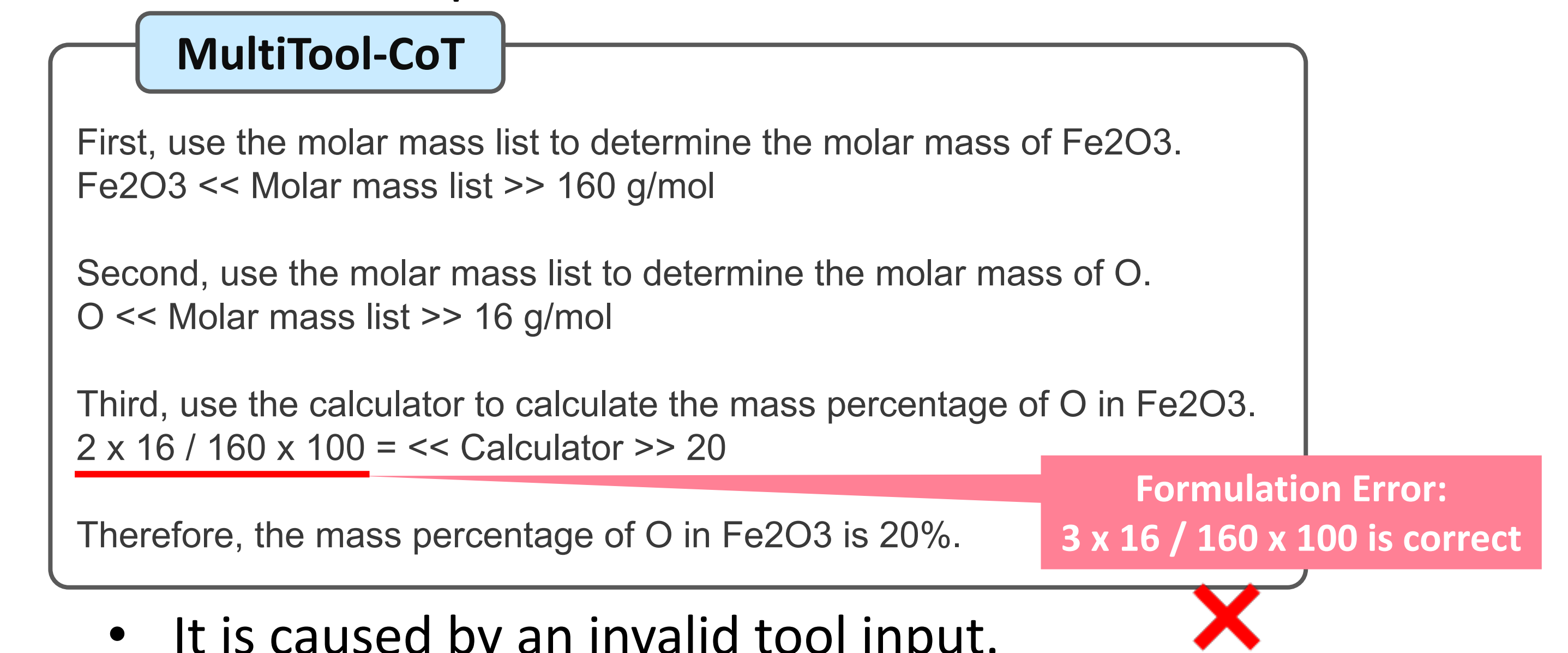
Case Study

- An improved example



- MultiTool-CoT can provide correct answers by relying on external tools.

- An error example



- It is caused by an invalid tool input.

Conclusion

- We proposed **MultiTool-CoT**, a novel framework that allows LLMs to use multiple external tools during reasoning.
- MultiTool-CoT** achieved SOTA on NumGLUE Task2.
- The proposed framework is general and can be applied to various tasks.
- Our code is available at <https://github.com/InabaTatsuro/MultiTool-CoT>