

# Room-temperature decomposition of PET

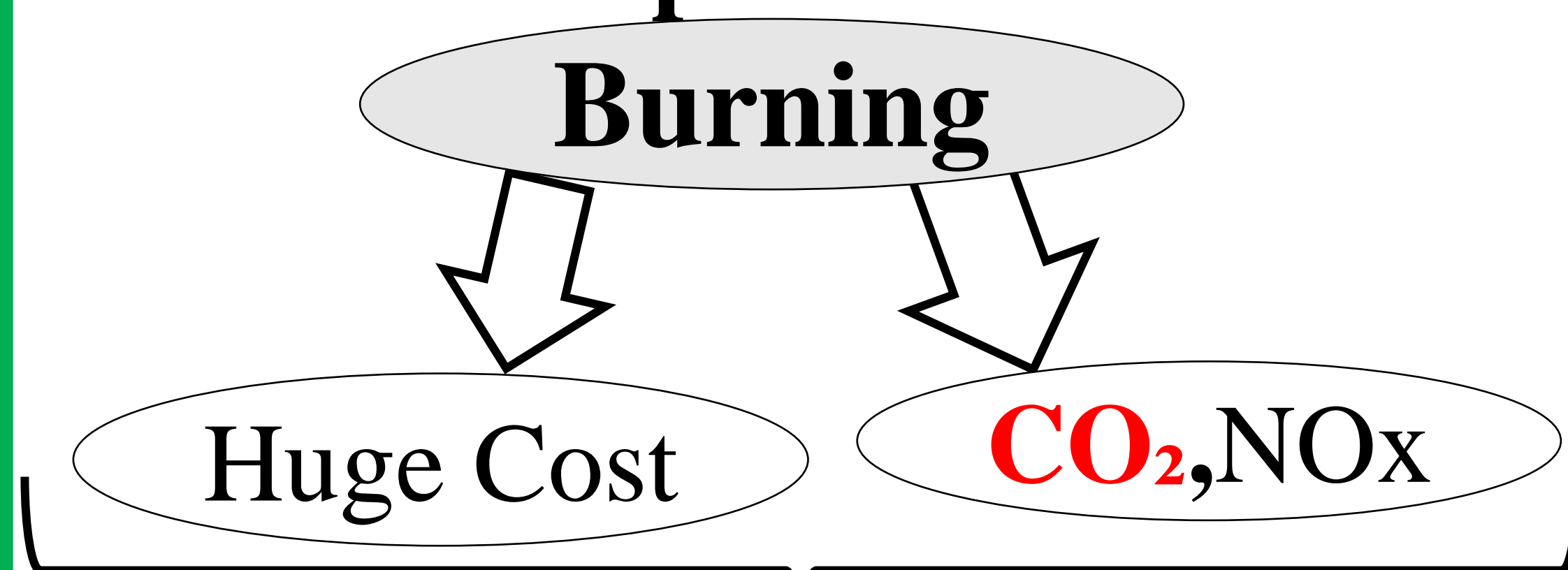
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## 1, Introduction

### ► Research Background

- Plastic → stay in nature (**400~1000 years**)
- Plastic disposal



Thrown into the ocean (**8M tons/year**)<sup>1)</sup>

Marine Pollution (**Microplastic**)

We need a ...

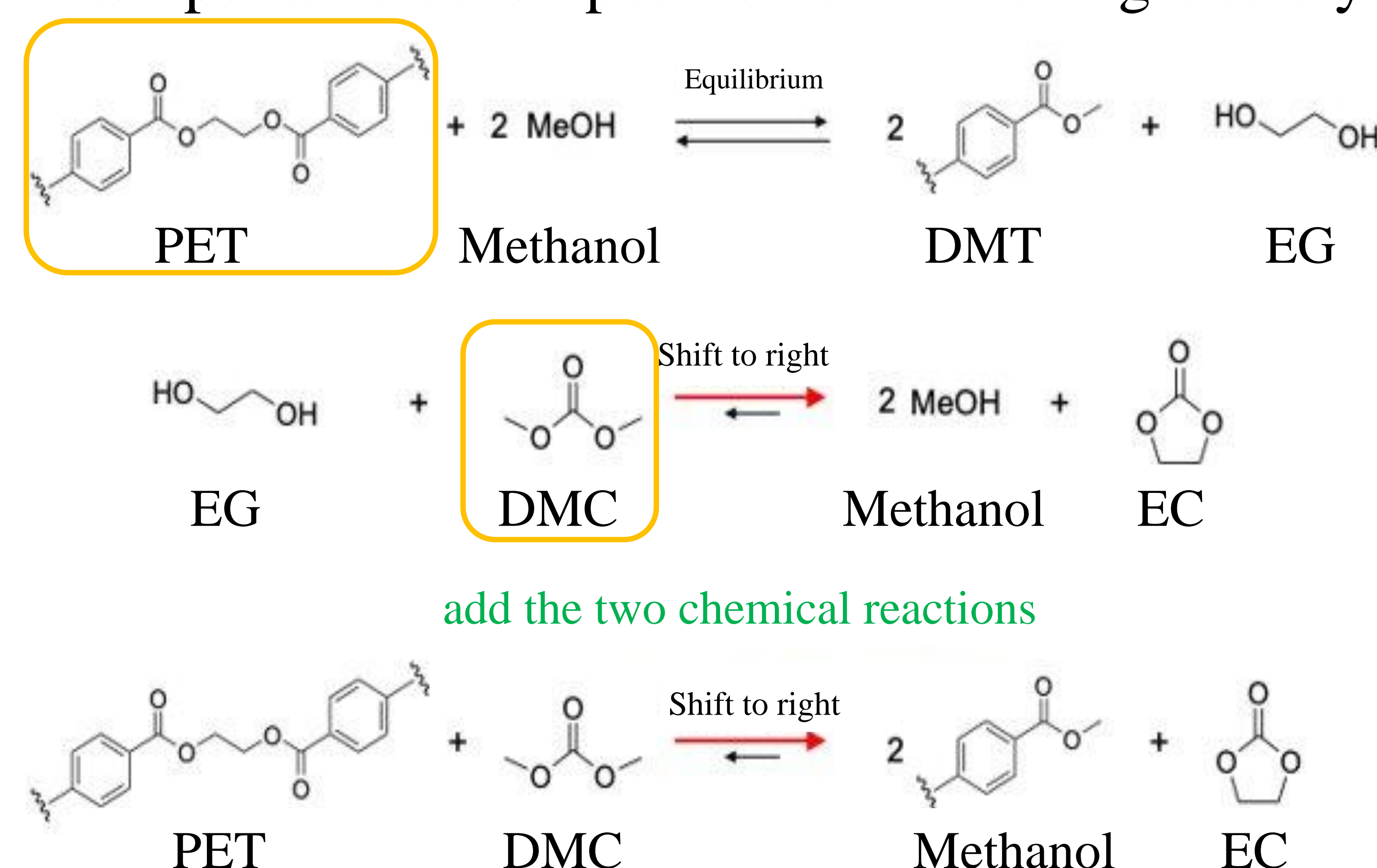
Lower-energy

Less-CO<sub>2</sub>

method

### ► Previous Research

Room-temperature decomposition of PET using a catalyst<sup>2)</sup>



Our Difficulty

Low reproducibility

### Research Objective

To explore

the causes of reaction failure

the possibility of decomposition of other polymers

## 2, Experiment 1 :Repeated experiments(about 25°C)

### Materials

- PET bottle pieces:4g
- Methanol:27ml
- alkoxide catalyst(NaOMe):2.3g
- DMC(Dimethyl carbonate):200ml



### ► Result

**1 success out of 3 tries**

Low Reproducibility

Other factors may prevent this reaction

Shifted equilibrium based on Le Chatelier's principle

## 3, Experiment 2

Lower temperature (about **5°C**)

Materials : same as Exp.1

► Result  
**No reaction**

## 4, Experiment 3

Higher temperature (about **85°C**)

Materials : same as Exp.1

► Result  
**No reaction**

## 5, Consideration ~Reason why the reaction wasn't promoted?~

Temperature ↓↑  
to promote the reaction

Other reasons

### 1. Substances

- Methanol
- Stain of PET

### 2. Condition

- Humidity

Solutions

**Dehydrated methanol**  
**Control conditions more strictly**

## 6, Future challenge

1 To make this experiment successful

2 To Apply to other polymers>>(PEN,PEG,etc)

Innovative plastic recycling method

CO<sub>2</sub>-free

Low-energy

= Sustainable

### References

(1)ambeck, J. R., et al. (2015). Plastic waste inputs from land into the ocean. Science, 347(6223), 768–771.

(2)Shinji Tanaka et al(2021) Capturing ethylene glycol with dimethyl carbonate towards depolymerisation of polyethylene terephthalate at ambient. Green Chem., 2021, 23, p9412–9416.