



Norwegian University of Science and Technology

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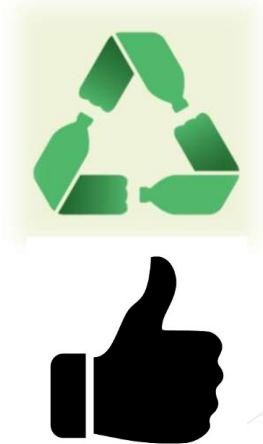
## Group 2

Further investigation into the toxicity of various recycled plastics and their potential effects on the environment

1

## Introduction

- ▶ Plastic pollution getting more attention
- ▶ People will be looking for solutions
- ▶ Re-use, Recycle, Burying, Burning
- ▶ Recycling commonly viewed as 'good'
- ▶ Is recycling good?



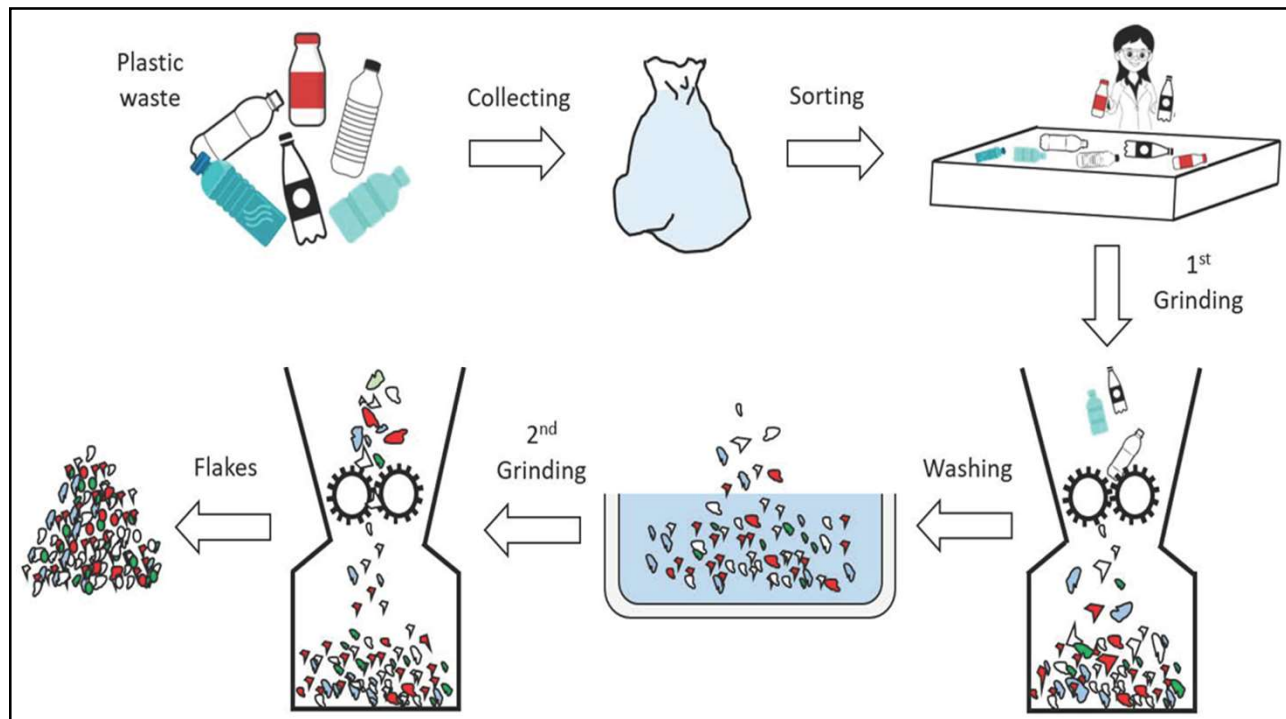
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## Recycling

- ▶ Mechanical- Physical methods aimed converting plastic waste into plastic pellets or directly into secondary materials.
- ▶ Chemical- Transformation of used plastic into hydrocarbon chemicals.



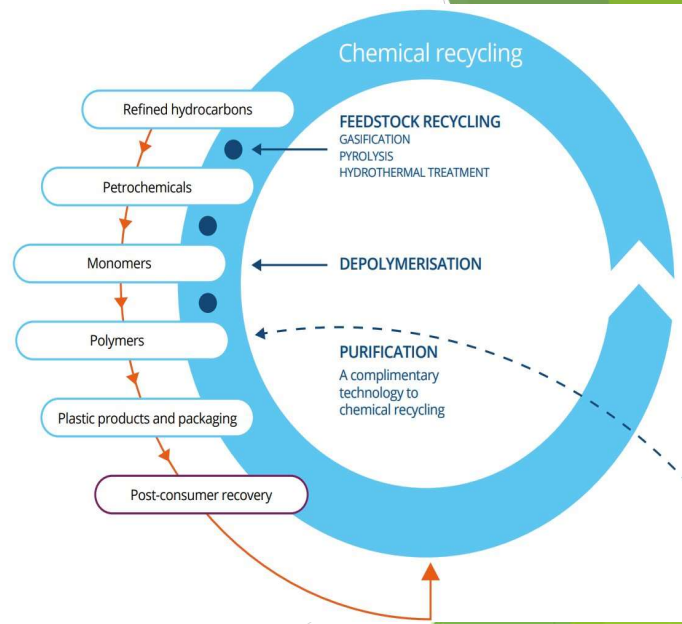
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4

## Chemical recycling

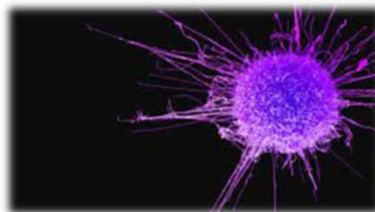
- ▶ PET methanolysis
- ▶ Hydrolysis
- ▶ Glycolysis
- ▶ Pyrolysis



5

## Plastic additives

- ▶ Virgin plastic is made to fit marketing niche
- ▶ Plasticizers, Antioxidants, Heat stabilizers, Slip agents, Etc
- ▶ Certain additives are likely dangerous (e.g. Carcinogenic)



6

## Persistent organic pollutants (POPs)

- ▶ Plastic can absorb certain pollutants
- ▶ POPs make plastic potentially more dangerous
- ▶ Examples include DDT, PCBs, PAHs, and aliphatic hydrocarbons



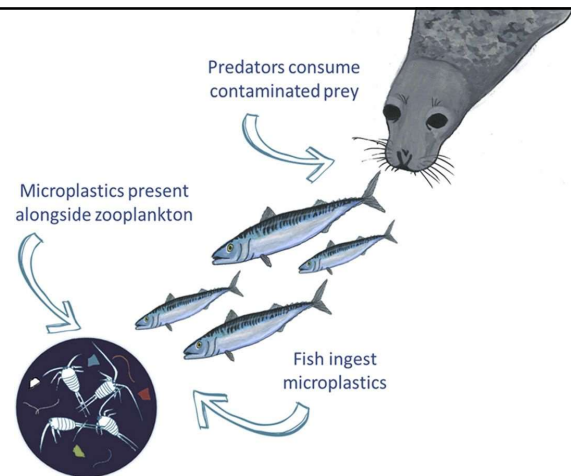
**Persistent  
Organic  
Pollutants**



7

## Trophic transfer

- ▶ From prey to predator
- ▶ POPs and microplastics can transfer
- ▶ From transfer to magnification
- ▶ Humans are top consumers



8

## Aims and Objectives

- ▶ First cohort ran preliminary tests
- ▶ Effects have been seen
- ▶ Need for further testing
- ▶ Gather available data on plastic and recycling
- ▶ Formulate a plan for future testing



9

## Results from first cohort

- ▶ Toxicity levels for this study were low, yet noticeable.
- ▶ Toxicity levels for both virgin and recycled plastic leachates of HDPE and PP were low, no toxicity was found for LDPE among virgin and recycled.
- ▶ Approximately three of the seven neonates were rendered immobile



*DAPHNIA MAGNA*

10

## Research to be done

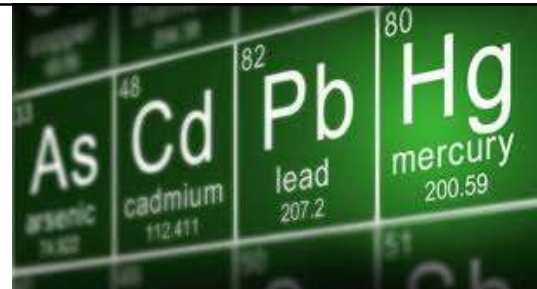
- ▶ Yeast oestrogen screen (YES)
- ▶ Yeast androgen screen (YAS)
- ▶ Yeast anti-oestrogen screen (YAES)
- ▶ Yeast anti-androgen screen (YAAS)
- ▶ Toxicity assay with:
  - ▶ *Vibrio fischeri*
  - ▶ *Daphnia magna*
  - ▶ *Selenastrum capricornutum* (Alga)
  - ▶ *Guppy*
  - ▶ *Eisenia Andrei* (Earthworm)
  - ▶ Contact test (Ostracod)



11

## Metal analysis

- ▶ Heavy metal concentration test using Gas Chromatography-Mass Spectrometry technique
  - ▶ Mercury (Hg)
  - ▶ Lead (Pd)
  - ▶ Cadmium (Cd)
  - ▶ Arsenic (As)
  - ▶ Manganese (Mn) etc.



12



## Conclusion

- ▶ OSTRACODTOXKIT F- R7 227.75
- ▶ ALGALTOXKIT F selenastrum- R6113.40
- ▶ DAPHTOXKIT F magna- R7 259.95
- ▶ Complete BioTox test kit- R4 094.00
- ▶ Metal analysis (50)- R38 800.00
- ▶ XenoScreen YES/YAS R- R 24 580.10



13

Group members

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14