**Mining Activity**

A picture containing toy, LEGO

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Welcome to the mines! Today we need your help to find the raw materials to make our plastic.

***What do you need to do?***

* Search for the raw materials inside your tray of rocks
  + Coal (bolts)



***COAL OIL***

* + Oil (paperclips)
* Keep the bolts and paperclips you find in your own pile

***How much “raw material” did we mine all together?***

Use the scales to weigh each miner’s mixed pile of coal and oil. Write down the actual weight and then round to the nearest gram!

***Miner #1:­­­­­­­*** *actual:****\_\_\_\_\_\_\_\_\_\_\_*** *rounded:****\_\_\_\_\_\_\_\_\_\_\_grams***

***Miner #2:*** *actual:****\_\_\_\_\_\_\_\_\_\_\_*** *rounded:****\_\_\_\_\_\_\_\_\_\_\_grams***

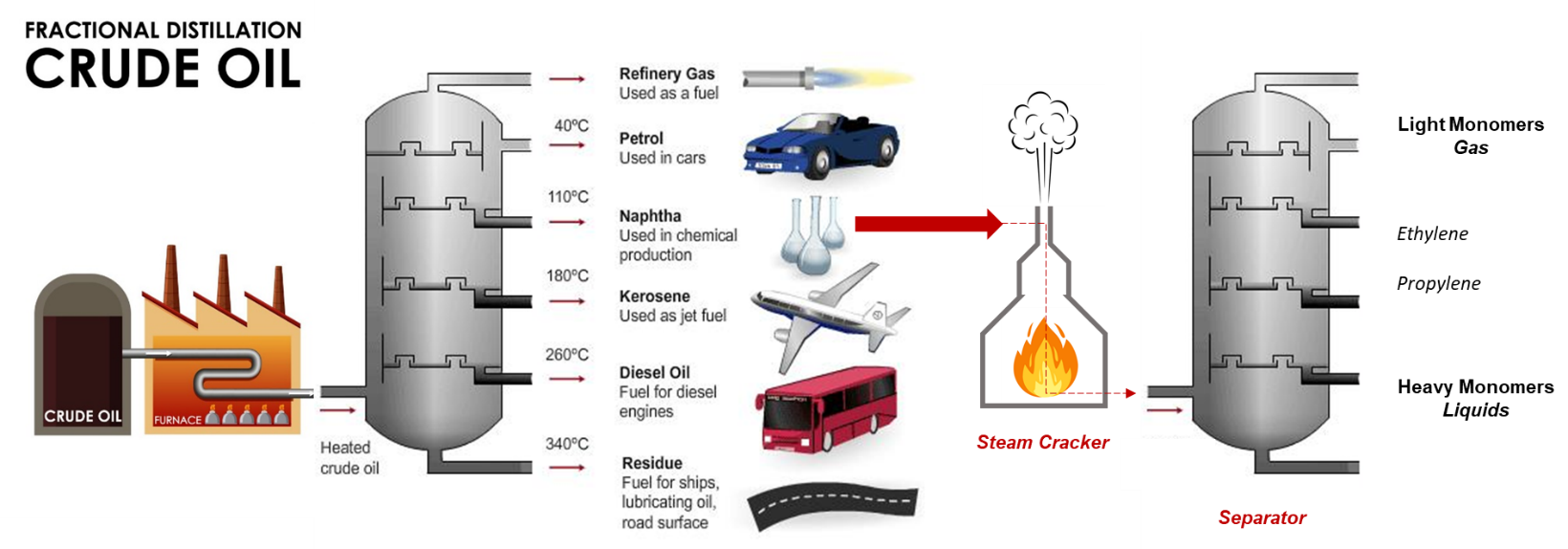
***Miner #3:*** *actual:****\_\_\_\_\_\_\_\_\_\_\_*** *rounded:****\_\_\_\_\_\_\_\_\_\_\_grams***

***Miner #4:*** *actual:****\_\_\_\_\_\_\_\_\_\_\_*** *rounded:****\_\_\_\_\_\_\_\_\_\_\_grams***

***Total: ­­­­\_\_\_\_\_\_\_\_\_\_\_\_grams***

**Separation Activity**

You have brought your crude oil and coal that you mined to the refinery. It is time to turn it into the building blocks (monomers) for our polymers!



***What do you need to do?***

* All the coal (bolts) can go together – so we can send it to the power plant
* All the crude oil (paper clips) needs to be separated into the different colors- these are our monomers
* Weigh each of the monomers

***How much crude oil did we mine all together?***

Use the scales to weigh each pile of the monomers

***Monomer #1:****color:****\_\_\_\_\_\_\_\_*** *number****: \_\_\_\_\_\_\_*** *weight:****\_\_\_\_\_\_\_\_\_\_\_\_grams***

***Monomer #2:****color:****\_\_\_\_\_\_\_\_*** *number****: \_\_\_\_\_\_\_*** *weight:****\_\_\_\_\_\_\_\_\_\_\_\_grams***

***Monomer #3:****color:****\_\_\_\_\_\_\_\_*** *number****: \_\_\_\_\_\_\_*** *weight:****\_\_\_\_\_\_\_\_\_\_\_\_grams***

***Monomer #4:****color:****\_\_\_\_\_\_\_\_*** *number****: \_\_\_\_\_\_\_*** *weight:****\_\_\_\_\_\_\_\_\_\_\_\_grams***

***Monomer #5:****color:****\_\_\_\_\_\_\_\_*** *number****: \_\_\_\_\_\_\_*** *weight:****\_\_\_\_\_\_\_\_\_\_\_\_grams***

***Monomer #6:****color:****\_\_\_\_\_\_\_\_*** *number****: \_\_\_\_\_\_\_*** *weight:****\_\_\_\_\_\_\_\_\_\_\_\_grams***

***Monomer #7:****color:****\_\_\_\_\_\_\_\_*** *number****: \_\_\_\_\_\_\_*** *weight:****\_\_\_\_\_\_\_\_\_\_\_\_grams***

***Monomer #8:****color:****\_\_\_\_\_\_\_\_*** *number****: \_\_\_\_\_\_\_*** *weight:****\_\_\_\_\_\_\_\_\_\_\_\_grams***

***Total: ­­­­\_\_\_\_\_\_\_\_\_\_\_\_grams***

***BONUS: How much does one paperclip weigh?***

**Polymerization Activity**

Now that we have all the refined building blocks (monomers), let’s make some polymers!

1. First, let’s try linking these paperclips together as a bunch of chains.
2. See if you can come up with different ways of linking paperclips other than a simple chain. Draw your original shapes here:

**Molding and Extrusion Activity**

You’ve brought your polymers to the molding and extrusion station.

Let’s make it into stuff we can use!

**A picture containing text, indoor

Description automatically generated**A picture containing floor, indoor, tiled

Description automatically generated**Graphical user interface

Description automatically generated Graphical user interface

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Mold is filled

Hopper

Pellets

Material is made into new item

Material in mold is cooled

Extrusion Unit

***What do you need to do?***

We must turn our polymer (Play-Doh) into shapes using our extrusion equipment!

***Extrusion:***

* Weigh out 50 grams of Play-Doh per person
* Split the 50g into 2 pieces, weigh each piece and mark it in the table below
* Push 1 piece out for each extruder (2)
* Weigh and inspect your final extruded item

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Initial Piece** | **Piece 1** | **Piece 2** | **Extruded 1** | **Extruded 2** |
|  |  |  |  |  |

***Molding:***

* Weigh out 50 grams of the material and split it into 5 pieces (as even as possible, but no need to be exact)!
* Fill one of your molds using the pieces available.
* Compare how many pieces for mold 1 and mold 2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **50÷5= ?** | **How many pieces for Mold 1?** | | **How many pieces for Mold 2?** | | **Difference in pieces for mold 1 and 2?** |
|  | Guess | Actual | Guess | Actual |  |

***Did the amount you put in match your final product?***