# Limonene in fruit peels

***Education in Chemistry***May 2019
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## Percentage of an amount

One of the molecules responsible for the citrus flavour in fruit such as lemons, oranges and mandarins is called limonene and it can be extracted and purified. The result is a strongly smelling clear oily liquid. Starting with 200 g of orange peel, 2.4 g of limonene was produced. What is the percentage of limonene in orange peel?

$$percentage of limonene in orange peel=\frac{part}{whole}×100\%$$

$$=\frac{2.4}{200}×100\%=1.2 \% $$

To visualise this with a bar model consider the following diagram:

**100%**

**10%**

**1%**

**20 g**

**200 g**

**2.0 g**

**1) Complete the table to show the percentage of limonene in different fruit.**

|  |  |  |  |
| --- | --- | --- | --- |
| Fruit | Mass of limonene (g) | Mass of fruit peel (g)  | Percentage |
| Orange | 2.40 | 200 | 1.20 |
| Mandarin | 4.21 | 156 | 2.70 |
| Lemon | 1.59 | 122 | 1.30 |
| Blood orange | 1.67 | 209 | 0.80 |

**2) What type of graph would be best to display the data?**

A bar chart, because the data is in categories.

**3) Draw an appropriate graph to display the data.**

Percentage of limonene in fruit peel



3.0

2.8

2.6

2.4

2.2

Percentage of limonene

2.0

1.6

1.8

1.4

1.0

1.2

0.8

0.6

0.4

0.2

Peel type

Blood orange

Lemon

Mandarin

Orange

**4) The percentage of limonene in lemons is typically about 1.8%. Complete the table to show the amount of limonene in different amounts of lemon peel.**

|  |  |
| --- | --- |
| Amount of lemon peel (g)  | Amount of limonene (g)  |
| 97 | 1.75 |
| 28 | 0.50 |
| 164 | 2.95 |

Divide 97 by 100 to get 1%: = 0.97 g

Then scale up: 1.8 x 0.97 g = 1.75 g