

In context

Subject area: Organic chemistry

Level: 14–16 years (Foundation)

Topic: Natural polymers

Source: rsc.li/3iF4Lvm

1. Salmon, french beans, basil, eggs and some nuts are some examples of superfoods.



Source: Envato Elements

These types of food contain many important nutrients.

- a) What is a 'nutrient'?

Answer: A substance in the diet that is important for good health and growth.

- b) Give two examples of important nutrients needed in our diet.

Answer: Two from – carbohydrates, fats, proteins, water, and in smaller amounts: vitamins and minerals.

Many important nutrients are polymers made from many smaller molecules.

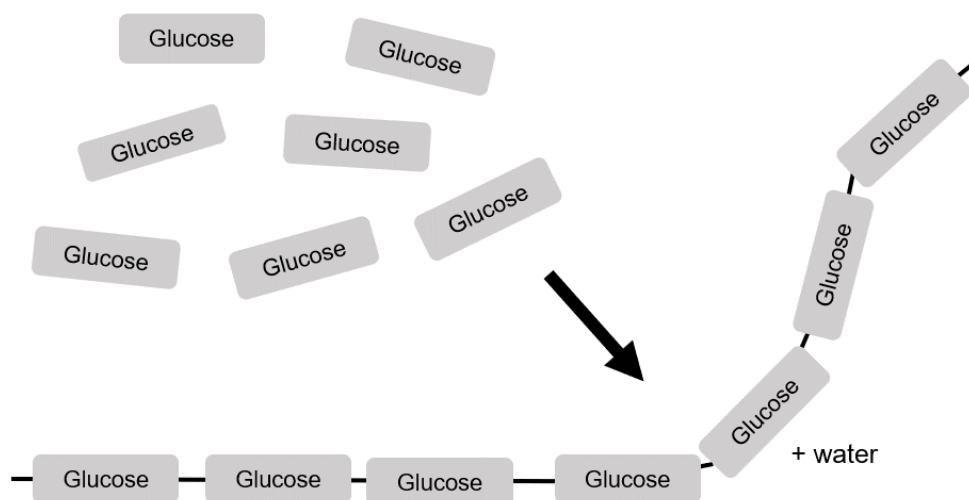
- c) Describe a polymer.

Answer: A very long chain molecule made of many smaller molecules bonded or joined together.

- d) Give the term to describe the small molecules that make a polymer.

Answer: Monomers.

The diagram shows a natural polymer being made from many glucose molecules.



e) State the name of the polymer being formed.

Answer: Starch or cellulose.

f) What type of polymerisation takes place when glucose forms the polymer in part e)?

Why does it have this name?

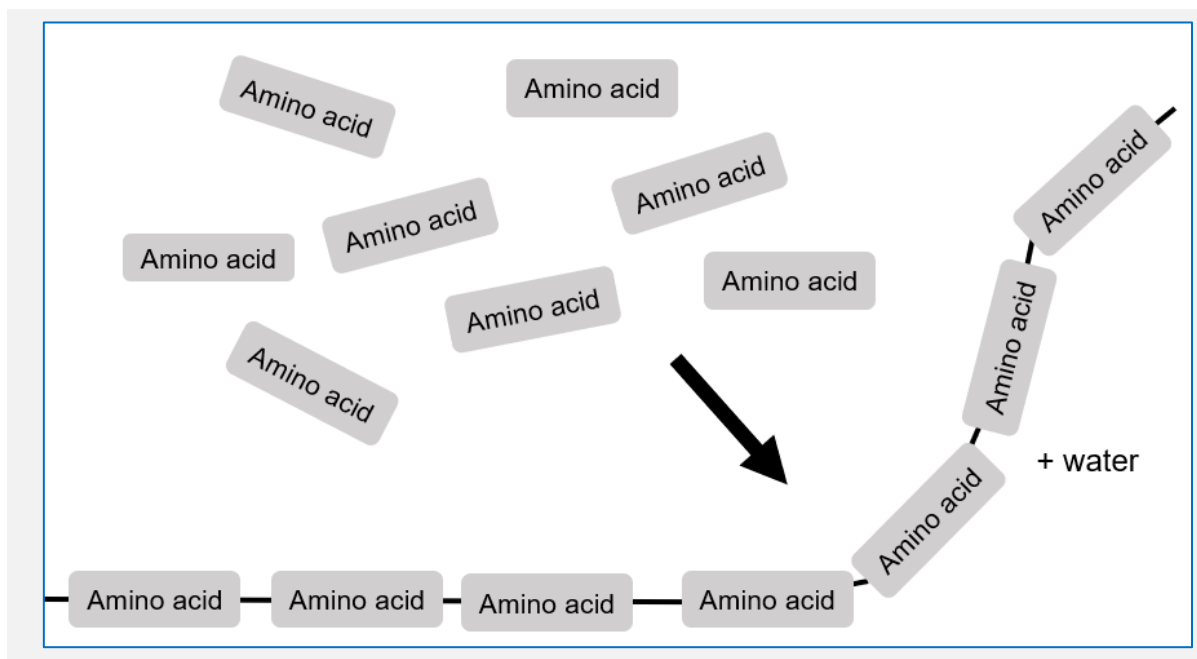
Answer: Condensation polymerisation.

A small molecule of water is formed as well as the polymer.

Another important type of polymer is made from amino acids.

g) Complete this diagram to show a polymerisation taking place.

Use the previous diagram to help you.



h) What is the name of this type of polymer?

Answer: A protein.

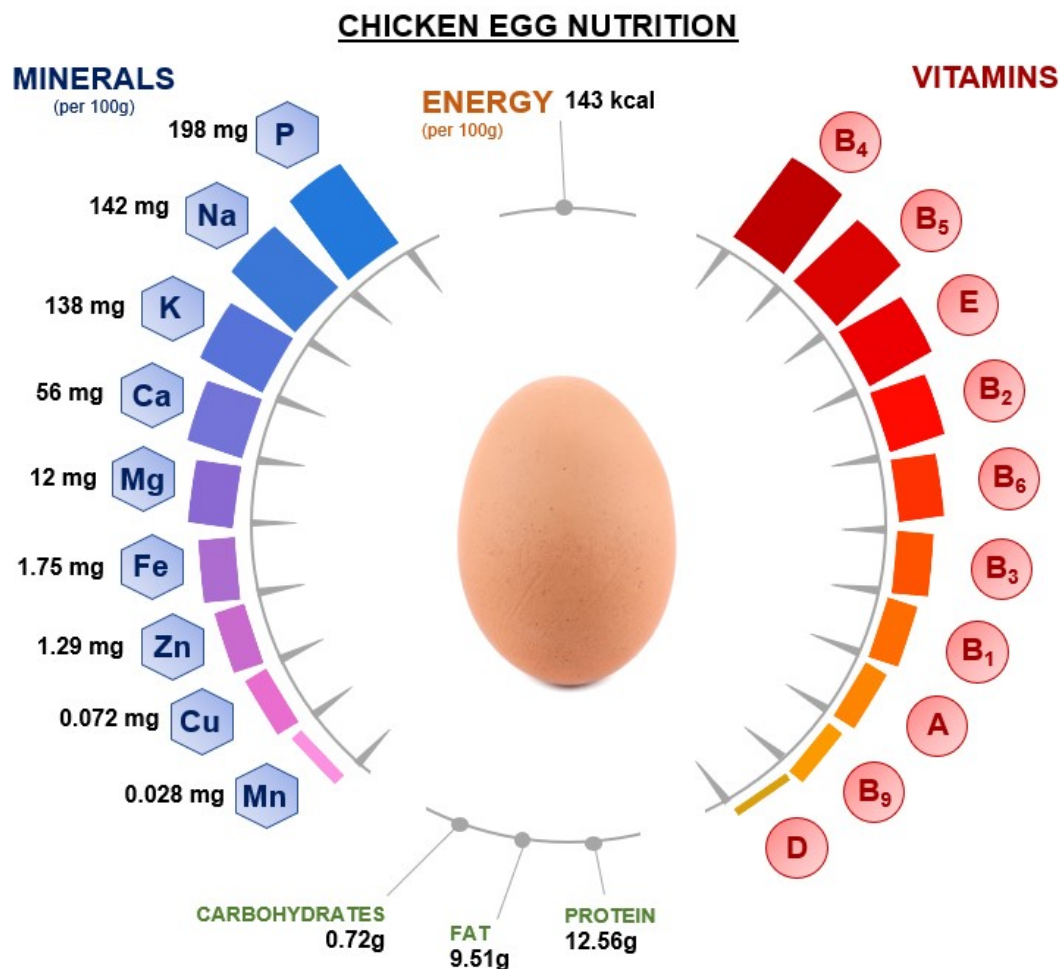
i) Give one similarity between the polymer in part g) and the one in part e).

Answer: Both are condensation polymers.

2. This question is about chicken eggs.

The diagram shows the mass of different nutrients in 100 g of chicken eggs.

Use the diagram to answer the questions.



Source: International bunch / adapted from Shutterstock

a) What is the mass of fat in 100 g of chicken eggs?

Answer: 9.51 g

b) What percentage of chicken eggs, by mass, is due to protein?

Answer: 12.56%

c) Write the mass of iron in grams.

Answer: 0.00175 g

d) Write the mass of vitamin A in grams.

Answer: 0.16 g

e) Write the mass of manganese in grams and in standard form.

Answer: 2.8×10^{-5} g

f) State the name of a nutrient in chicken eggs that is a polymer.

Answer: Protein.

g) Which of the nutrients in the diagram has the:

i) largest mass?

Answer: Protein.

ii) smallest mass?

Answer: Vitamin D.

h) Why is the total mass of all of the nutrients in the diagram not equal to 100 g?

Answer: Water is not included.