

Glucose solutions for diabetes simulation activity

The activity

Students use a clue-card activity to model changes in blood glucose levels through fasting and a meal. They use this information to construct a graph of blood glucose and insulin levels. They are then provided with a scenario involving 'plasma' samples from two people who may or may not have a disorder of glucose homeostasis. Working in groups, they are given 6 plasma samples from each person (12 samples in total) and 12 glucose test strips (Diastix) to measure the glucose concentration. This shows whether the people have normal or disordered blood glucose regulation.

Background – biologically relevant values

Normal fasting blood glucose = 3.5-5 mM

Normal blood glucose after glucose meal in oral glucose tolerance test OGTT: 6-8 mM (<10mM)

Indication of disordered glucose homeostasis (diabetes): >10mM 30min after glucose drink in OGTT

For this activity:

Set up 12 tubes each with at least 1mL glucose solution. 12 Diastix

Person A Healthy	Tubes A1-A6	1 - low	2 - medium	3 - high	4 - medium	5 - low	6 - low
Person B Diabetic	Tubes B1-B6	1 - low	2 - medium	3 - high	4 - high	5 - high	6 - high

Materials

- D-Glucose
- Diastix

Method

Prepare glucose solution (only D-glucose will be detected by the Diastix. Other sugars will not be detected).

D-glucose molar mass = 180.1559 g/mol

1M solution = 180.16 g/L = 18.0g/100mL = **1.8g/10mL**

Prepare a 1M glucose stock solution in dH₂O. Dilute according to the table below.

Prepare glucose solutions of 5mM, 10mM, 30mM

Tube label	Concentration of D-glucose	Total volume 100mL	
		Volume of 1M glucose (mL)	Volume of water (mL)
LOW	5mM	0.5	99.5
MEDIUM	10mM	1	99
HIGH	30mM	3	97

Adjust the volume appropriate to your requirements, e.g. if you need 200mL of 5mM solution, add 1.0 mL of 1M solution to 199mL of dH₂O. Add a tiny amount of yellow food dye to get a 'straw' colour like plasma.

Sourcing materials:

D-glucose - general chemical suppliers

Diastix - Southern Biological [G10.41 - Diastix](#) \$10.30 pk 50