

Osmometry worksheet

A Osmosis. Vocabulary warm-up

B Osmometry. Reading.

Osmometry is a technique for measuring the concentration of particles in a solution, i.e., osmolar concentration.

When a solute is dissolved in a pure solvent, the following properties of the solvent are changed:

The freezing point is depressed;

the boiling point is raised;

the osmotic pressure is increased;

the vapor pressure is lowered.

The freezing point of pure water is precisely 0 °C at atmospheric pressure.

Ideally, 1 mol of a non-dissociating solute such as glucose, dissolved in 1 kg of water, depresses the freezing point by 1.86 °C.

The freezing point depression also depends upon the degree of dissociation of the solute.

For example, if 1 mol of sodium chloride were to completely dissociate into two ionic species (Na⁺ and Cl⁻) in 1 kg of water, the freezing point would be depressed by 3.92 °C.

The freezing point osmometer is the most commonly used method for measurement of osmolality in the chemistry laboratory. When using this device, a patient sample is supercooled below its freezing point; the sample in the measurement cell is still fluid. In the measurement chamber, immersed in the sample, is a temperature sensing thermistor and a stirring wire. When the wire agitates the supercooled sample begins to freeze. The process of freezing releases heat and the supercooled solution warms to its freezing temperature.

Supercooling

The tendency of a substance to remain in the liquid state when cooled below its freezing point.

Crystallisation temperature

Aqueous solutions can be induced to freeze (i.e. crystallise) most reliably when supercooled. Supercooled crystallisation is induced by agitating the solution (freeze pulse).

C Osmometry – listening

A Listen and fill in the gaps.

1 The technician is going to demonstrate how to use an _____ micro-osmometer to measure the _____ of a given _____.

2 If there are _____ in the sample, you should take a new sample. Their presence is checked _____.

2 The instrument will run the test for about _____ minute(s).

3 The results are shown in _____.

4 Before repeating the measurement, you should clean the _____.

5 After the measurement, you should put away the sampler _____ by pushing firmly on the sampler _____.

B Fill in the verbs and put the steps in order.

insert	crack	dip	load	inspect	push	record	remove
discard		place					

- 1 _____ up 20 µl of sample
- 2 _____ your result
- 3 _____ the used sampler tip
- 4 insert a dry chamber cleaner into the sample port
- 5 to start the test, _____ the operating cradle until it stops
- 6 be careful not to _____ the sample tip
- 7 _____ the used sampler tip from the sampler
- 8 visually _____ for the presence of air bubbles
- 9 wipe the plunger tip with a soft paper tissue
- 10 remove the sample from the operating cradle
- 11 _____ the sampler plunger into the proper place
- 12 _____ the sample into the sampler port
- 13 _____ the sample tip into the fluid
- 14 First, insert the sample tip into the sampler

D Grammar

7.1 Read the situations and write sentences. Use the following verbs in the present perfect:

arrive break fall go up grow improve ~~lose~~

- | | |
|---|------------------------------|
| 1 Tom is looking for his key. He can't find it. | Tom <u>has lost his key.</u> |
| 2 Lisa can't walk and her leg is in plaster. | Lisa _____ |
| 3 Last week the bus fare was £1.80. Now it is £2. | The bus fare _____ |
| 4 Maria's English wasn't very good. Now it is better. | Her English _____ |
| 5 Dan didn't have a beard before. Now he has a beard. | Dan _____ |
| 6 This morning I was expecting a letter. Now I have it. | The letter _____ |
| 7 The temperature was 20 degrees. Now it is only 12. | The _____ |

8.3 Write four sentences about yourself. Use I haven't and choose from the boxes.

used a computer travelled by bus eaten any fruit
 been to the cinema read a book lost anything

- 1 I haven't used a computer today.
- 2 _____
- 3 _____
- 4 _____
- 5 _____

today
 this week
 recently
 for ages
 since ...
 this year

9.2 Write a question for each situation.

- 1 You meet Paul as he is leaving the swimming pool.
 You ask: (you / swim?) Have you been swimming?
- 2 You have just arrived to meet a friend who is waiting for you.
 You ask: (you / wait / long?) _____
- 3 You meet a friend in the street. His face and hands are very dirty.
 You ask: (what / you / do?) _____

9.3 Read the situations and complete the sentences.

- 1 It's raining. The rain started two hours ago.
 It 's been raining for two hours.
- 2 We are waiting for the bus. We started waiting 20 minutes ago.
 We _____ for 20 minutes.
- 3 I'm learning Spanish. I started classes in December.
 I _____ since December.
- 4 Jessica is working in a supermarket. She started working there on 18 January.
 _____ since 18 January.
- 5 Our friends always spend their holidays in Italy. They started going there years ago.
 _____ for years.