Question 1:

A biosensor for gas and VOC sensing comprises:

❍ Metal-oxide semi-conductors coupled to signal transducing units.

● Bioreceptors immobilized onto surfaces.

Explanation:

The term "biosensor" implies that a biologic molecule acts as the sensing material like proteins or peptides. However, the sensing material may be deposited in several surface compatible with defined transducing systems.

❍ None of the above.

❍ All statements are correct.

Question 2:

Odorant Binding Proteins are present in mammals and insects. Their function is to:

● Transport less soluble VOCs to olfactory receptors.

Explanation:

It is believed that less soluble VOCs first bind to OBPs that carry them to the ORs in the olfactory sensory neurons. Morehydrophilic VOCs are able to cross the mucosa or lymph to bind directly to ORs. Furthermore, it is also believed that OBPs act as scavengers when VOCs are present in high amounts.

❍ React with odors to change their chemical properties.

❍ Protect the nose against bad odors.

❍ None of the above.

Question 3:

ORs can be used in gas sensing using several strategies, including the incorporation into nanodiscs. Why is this procedure followed?

❍ Nanodiscs are very fragile and stable for only 24h.

● ORs in nanodiscs are more stable over time than ORs in micelles.

Explanation:

Reports demonstrated that ORs in micelle sensors remained active for 5 days in contrast with nanodisc OR sensors , which were stable for 10 weeks, after an initial decrease in response. The longer integrity may be due to the higher stability of the nanodiscs structure in contrast to the micelles.

❍ Nanodiscs produce a different sensor response comparing with micelles.

❍ None of the above.

Question 4:

How can we use "in vitro" evolution methods to find new peptide sequences binding to a particular VOC?

❍ By mimicking the VOC-OBP binding site using computational design approaches.

❍ By chemically synthesizing random peptide sequences.

● By panning phage display libraries of peptides against the VOC of interest.

Explanation:

To broaden peptide sequence variability and find sequences for specific VOCs, combinatorial screening techniques such as phage-display and virtual screening deliver the means to accomplish this task. Phage-display is implemented when a VOC analog is able to be immobilized onto a surface or a VOC-analog surface can be used to

screen randomized peptides for binding.

❍ All statements are correct.