First 2010
VIVA 2

This viva will test your knowledge of hypoxemia, oxygen therapy and pulse oximetry The following is a blood gas of a young person who has taken a sedative drug overdose.
pH 7.2 PO2 40 mmHg PCO2 80 mmHg HCO3- 28 mmols/L
Describe this blood gas Apart from being asked to describe the blood gas, candidates were also asked about the Henderson-Hasselbach equation, causes of hypoxaemia, pulmonary shunt, response to supplemental oxygen and pulse oximetry.

"Please describe the values of the gas and relate them to the clinical presentation"

pH normal range is 7.35 to 7.45, therefore this patient has an acidaemia
pCO2 normal range is 35-45, therefore this patient is hypercapnic
the HCO3 normal value is 24, it's elevated consistent with acute resp acidosis HCO3 = 24 + 1(PCO2 - 40)/10
therefore this patient has a pure respiratory acidosis with partial compensation
the PO2 normal value is 90-105, therefore there is a hypoxaemia. This is equivalent to a Hb sat of ~75%

"Please write the Henderson Hasselbach equation"

$pH = pKa + \log_{10}[base]/[acid]$

$pH = 6.1 \log [HCO3]/[pCO2]0.03$ the 0.03 is the solubility co-efficient of CO2

"Could you describe the most common causes of hypoxaemia"

hypoxaemia defined as an arterial blood PO2 less than normal value,
different texts use different values, 70 mmHg represents the start of the ODC steep section

inspired air causes
- reduced atmospheric partial pressure - altitude, flying
- reduced partial pressure of O2 - anaesthetic machine failure

lung causes
- pathological shunt - pneumonia, collapse, obstruction, FRC<closing capacity, extrathoracic shunt
- increased VQ mismatch - PE

decreased delivery to the periphery
- according to the equation O2 flux = CO(Hb x sats x 1.34 + dissolved O2)
- decreased CO or Hb
- abnormal Hb

increased O2 extraction
- due to hyper-metabolic states - sepsis, seizures, MH