

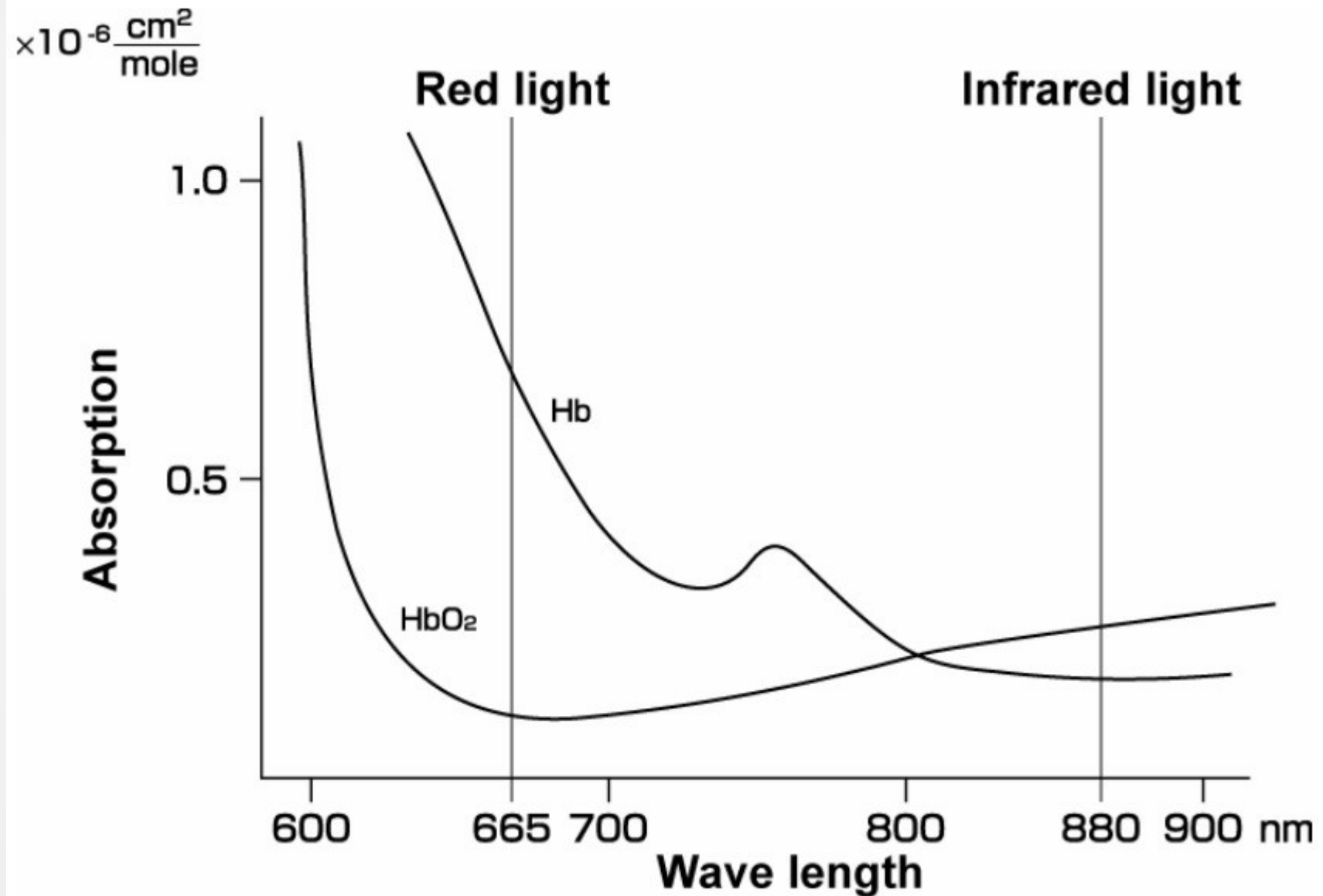
Pulse Oximetry by BMETWiki



What is a pulse oximeter?

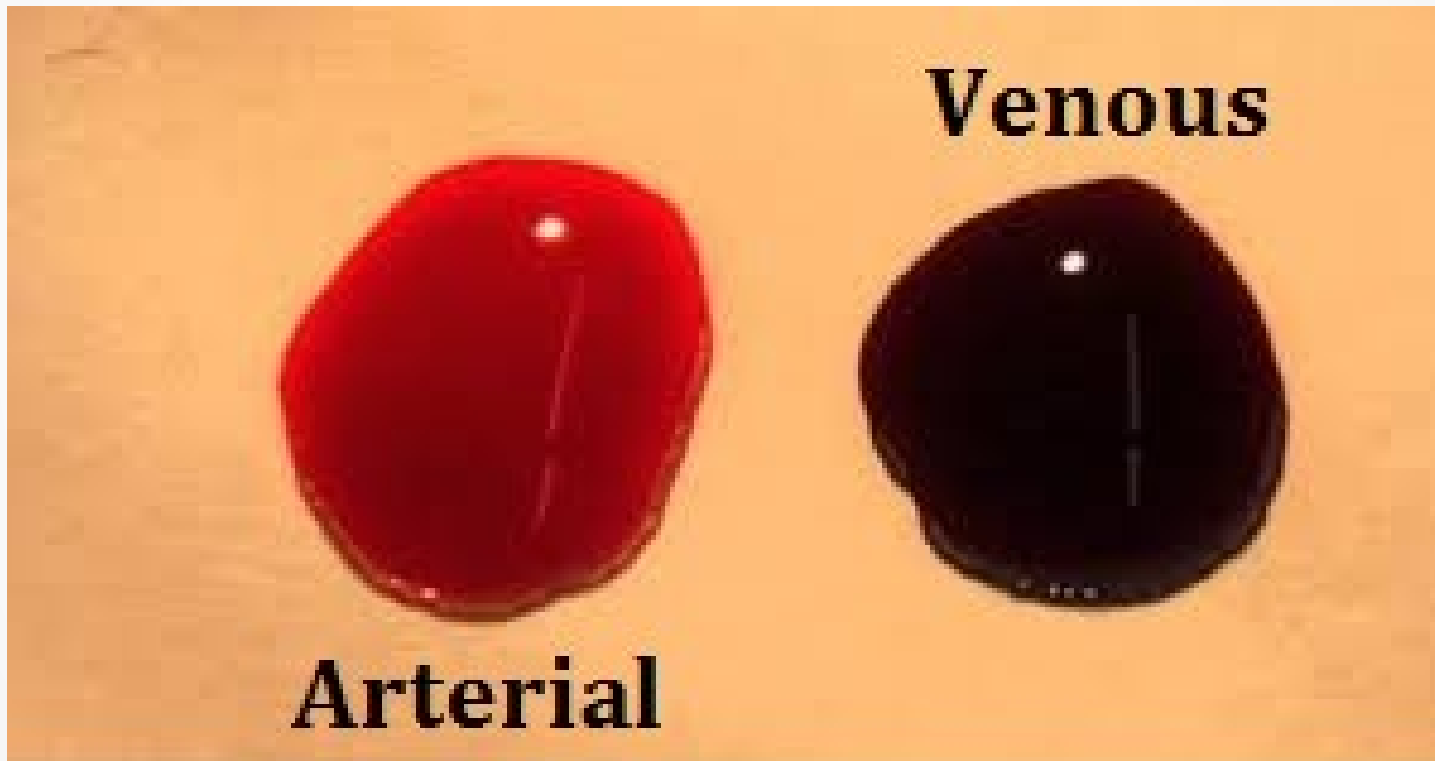
- Uses two frequencies of light (i.e. red and infrared) to determine “%” of hemoglobin in the saturated blood with O_2 .
- The “%” is called SpO_2 .
- Measured transluently through either:
 - Finger's
 - Toe's
 - Earlobe

Wavelength



Color of Blood

Venous is dark red



Arterial is bright red

Hemoglobin

- An iron protein that carries oxygen from the lungs to body tissues and organs.
- Its the red pigment that makes up a red blood cell.
- Transports CO_2 from body tissues and organs back to the lungs.



Clinical Applications

- 95% is for a normal adult.
- <92% indicates difficulty breathing (e.g. patients with acute respiratory pneumonia, COPD, asthma) and requires patient to supplement O₂ treatments.

What is O2 saturation?

- Hb O2 - concentrated oxygenated hemoglobin
- Hb - concentrated deoxygenated hemoglobin
- Formula (may bind 1:4 O2 molecules)
 - $\text{Saturation} = (\text{Hb O}_2 / (\text{Hb O}_2 + \text{Hb})) \times 100\%$

Purpose

- Pulse oximeter are mostly used for:
- Determining severity of disease through screening, diagnosis, followup, and self-monitoring.
- Home oxygen therapy
- Vital sign monitoring
- Screening patients with sleep apnea and dysphagia

False sensor readings

- Incorrect sensor position and improper use can cause false sensor readings
 - Fingers and toes with nail polish, dirt, or artificial nails.
 - Strong ambient light
 - Incorrect positioning (i.e. optical shunting)
 - Patient condition and diagnosis (i.e vasoconstriction)
 - Dirty or damaged sensor
 - Patient movement
 - CO₂ presence

Calibration

- Q: *Is calibration required?*
- A: No! pulse oximeters do not require “zero” and “gain” calibrations because of their design. Today’s devices “zero” calibration is continuous as well as automatic thus no need to re-zero the device and “gain” accuracy calibration is not required nor is it measured with these devices.

References

- WHO. “Pulse oximetry: training materiel”.
http://www.who.int/patientsafety/safesurgery/pulse_oximetry/tr_material/en/
- Smith Medical. Why pulse oximeters don't need calibration.
<http://www.turnermedical.com/v/vspfiles/files/pdf/Calibrationnotneeded.pdf>

Questions

