

# [Gas exchange essay sample](https://assignbuster.com/gas-exchange-essay-sample/)

A. Physical constraints on gas exchange: partial pressure of gassses – pressure exerted by a particular gas in a mix of gases   
21% O2 P02= 760mm Hg\*. 21 = 159. 6 mm Hg

B. Respiratory medium   
1. air : 21% 02, low density, low viscosity, easy to move over a surface and thru vessels 2. water: 4-8ml 02/L, 02 solubility decreased by higher temp and higher salt conc., water dense, viscous, more work to move over surface

C. Diffusion rates   
– all 02 and C02 exchange occurs by diffusion   
– Fick’s law of diffusion   
Qs= DA C2-C1/x \*t   
Qs= quantity of substance   
d= diffusion constant, A= area of surface, C2-C1 conc gradient , x= thickness of surface, t = time Characteristics of respiratory membranes   
– large surface area (A)   
– large concentration difference (c2-c1)   
-thin(small x)

II. Respiratory surfaces   
A. Body surface   
– amphibians, earthworms   
B. Specialized surface   
-must be ventilated : respiratory medium moved across surface – maintains high C2-C1   
I. Aquatic animals   
– gills-projections of body surface   
Counter current flow in fish gills   
– fig 42. 23, blood flow thru and water flow over gill filament is counter current, maximized o2 exchange 2. Terrestrial animals   
a. insects- branching system of air tubules, all body cells w/i diffusion distance tracheole end b. mammals, birds, reptiles lungs: branching system of air tubules, ends in alveoli= air sacs of surrounded by capillaries -alveoli are site of gas exchange

III. Respiratory pigments   
A. Structure: metalloproteins that increase solubility of O2 in blood, hemocyanin: metal = Cu, arthropods hemoglobin – metal = Fe, vertebrates, most invertebrates Hemoglobin   
– 4 subunits, proteins with quaternary structure, each contains Fe and bins (1) O2 B. Properties   
1. Cooperativity – (1) O2 binds, Hb molecule changes shape, easier for 2nd, 3rd, 4th, 02 molecs to bind % saturation of Hb with 02- 25% saturation= 25% of 02 binding sites in a hemoglobin solution are occupied x axis- P02 (mm Hg)

y axis- % saturation of Hb with O2   
graph goes up and curves off at the end like an (S) shape fig 42. 31

2. pH sensitivity: Bohr effect   
-pH affects O2 affinity of Hb   
lower ph decreases Hb O2 affinity

Significance of pH sensitivity   
\* RBC pH decreases in capillaries supplying body tissues   
\* co2 +h2o = H2CO3 = HCO23- + H+   
\* H+ binds to Hb, changing its shape so 02 is relased and diffuses \* in lungs O2 diffuses into RBC   
\* High O2 displaces H+ from Hb   
CO2 diffuses out of RBC and into alveoli   
\*   
CH. 44- Osmoregulation   
– controlling solute conc and water gain/loss from body fluids A. Purpose   
– Cell fxn requries specific, stable solute conc.   
B. Osmolarity   
– moles solute/L   
– units: mOs m/L   
C. Osmotic challenges

1. Conformers & regulators   
x axis= external mOsm/L   
y axis = internal mOsm/L   
2. Marine animals   
a. Shark   
– body fluid (salt) < seawater   
– body fluid osmolarity = 1000 mOsm   
– high (urea) and (trimethylamine oxide)   
– no water loss