NORMAL ABG VALUES

pH	7.35 - 7.45
$PaCO_2$	4.7 - 6.0 kPa
PaO_2	11 - 13 kPa
HCO_3-	22 - 26 mEq/L
Base Excess	-2 to +2 mmol/L
Lactate	<2 mmol/L

QUICK INTERPRETATION - OXYGEN

PaO_2 (on air)

< 8 kPa	< 11 kPa	≥ 11 kPa
Hypoxaemic -with- Respiratory Failure	**Hypoxaemic -without- Respiratory Failure**	**Normal on Air -or- Adequate O_2 therapy**
Start / Increase O_2 therapy		On air: **No O_2 required**
COPD: • Aim for pO_2 > 8 • Raised pCO_2 with Raised HCO_3- ◦ Suggest CO_2 retainer **Caution with O_2 / Discuss with Senior**		On O_2: **Cont with FiO_2**

Respiratory Failure

pCO_2 < 6 kPa	**Type 1**
pCO_2 > 6 kPa	**Type 2**

Be wary of normal pCO_2 with Hypoxia in asthmatic patient
Sign of tiring and may require HDU/ITU support
Discuss with Senior

Expected kPa on O_2 = FiO_2 - 10
Patient on 40% FiO_2 should have pO_2 30 kPa

Thus do not be falsely reassured with a normal pO_2 if patient is on high-flow oxygen. **Discuss with Senior**

QUICK INTERPRETATION - ACID / BASE

pH → Determine if Acidotic or Alkalotic

$PaCO_2$ → Does $PaCO_2$ explain pH

YES	NO
Respiratory cause	**Metabolic cause**

pH	**Acidotic < 7.35**		
$PaCO_2$	**Low < 4.7**	**Normal 4.7 - 6.0**	**High > 6.0**
Cause	**Metabolic Acidosis + Partial Respiratory Compensation**	**Metabolic Acidosis**	**Respiratory Acidosis** + Partial Metabolic Compensation if HCO_3- raised

pH	**Alkalotic > 7.45**		
$PaCO_2$	**Low < 4.7**	**Normal 4.7 - 6.0**	**High > 6.0**
Cause	**Respiratory Alkalosis**	**Metabolic Alkalosis**	**Metabolic Alkalosis + Partial Respiratory Compensation**

Mixed Acidosis / Alkalosis

Possible to have mixed causes of acidosis / alkalosis
- i.e. acidosis due to both respiratory and metabolic cause

$PaCO_2$ and HCO_3- will move in opposite directions:
- i.e. PaCO2 HIGH and HCO3- LOW

CAUSES OF ACID / BASE DISTURBANCES

Respiratory Acidosis

Inadequate ventilation:
- Obstructive airway disease:
  - COPD
  - Asthma
- Respiratory depression:
  - Opiates
  - Neurological (Guillian-Barre)

Respiratory Alkalosis

Excessive ventilation:
- Anxiety
- Pain
- PE
- Pneumothorax

Metabolic Acidosis

Increased Acid production / Ingestion:
- DKA
- Increased Lactic acid (i.e. sepsis)
- Aspirin overdose

Decreased Acid excretion:
- Renal failure
- Renal tubular acidosis
- Addison's disease

GI Loss HCO_3-:
- Diarrhoea / High Ileostomy output

Metabolic Alkalosis

Increased Acid loss:
- GI HCO_3- loss:
  - Vomiting
- Renal loss (contraction alkalosis):
  - Diuretics (Loop and Thiazides)
  - Hyperaldosteronism
  - Heart failure / Dehydration:
    - RAAS system activation

Ingestion HCO_3-
- Excessive Antacids