

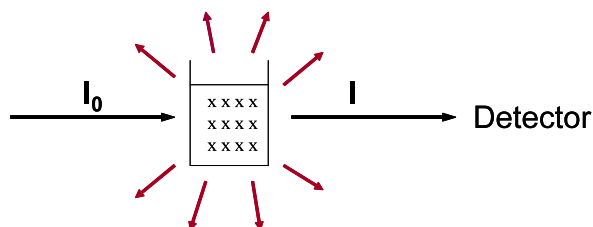
Describe and compare the principles of immunoturbidimetry and immunonephelometry. Discuss their uses and limitations.

The question suggests at least 3 different sections to be covered. The model answer will be structured into clearly defined sections – perhaps separately titled to break the text up. This shows a well planned/thought out answer and is easier to mark.

Section 1 Principles and instrumentation

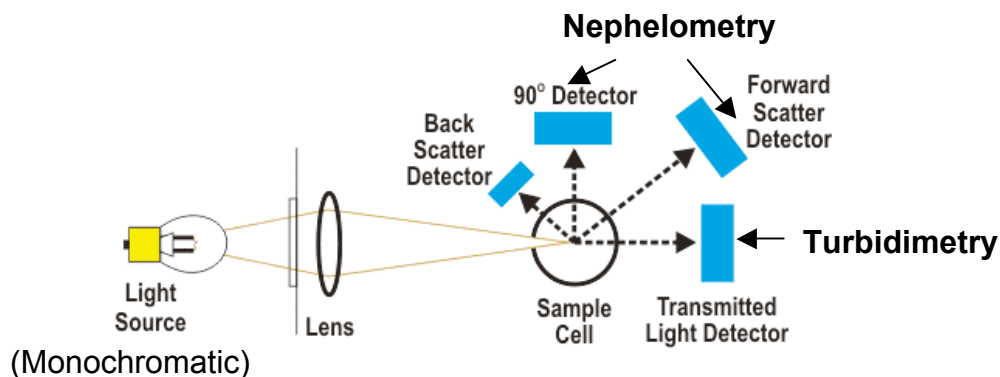
Diagrams are essential when describing analytical techniques. Leave plenty of space to label them clearly.

The basic principle – light scattering. The presence of insoluble particles in a measuring cell causes scattering of incident light. The amount of light scattered is proportional to the concentration of insoluble particle. (Rayleigh equation)



In immunoturbidimetry and immunonephelometry – Antibodies to the analyte of interest are used. These form Insoluble Antibody-antigen complexes which precipitate in the measuring cell, causing light scattering.

Diagram of the instrumentation



Immunoturbidimetry – Detector at 180° to incident light. Measure the decrease in transmitted light caused by light scattering

- Advantages –
- Can perform on routine analysers as same equipment
 - High throughput
 - Good turnaround time

- Disadvantages-
- Sensitivity inferior to nephelometry
 - Improving

Immunonephelometry - Angle of detection varies, commonly 90° . Measuring the amount (intensity) of light scattered at that angle.

Advantages - Sensitivity – measuring against null background

Disadvantages- Need dedicated analyser
Cost implications
Slower turnaround

Choice of technique depends on clinical demands, other assays provided and equipment already in place.

Section 2- Clinical applications

Most commonly used for serum proteins with concentrations above 5mg/L

Immunoglobulins	CRP
B2M	Caeruloplasmin
AGP	C3, C4
RF	Free Light chains

Also used for urine microalbumin.

Not used for Serum albumin, total protein or urine total protein as concentrations sufficient to use colourimetric methods instead. Reagents cheaper.

Below 5mg/L need more sensitive detector – immunoassay.

Section 3 – Limitations

Antigen xs (hook effect) can be seen, especially on Free Light chains and urine albumin due to large range.

Identifying it can be difficult – easier if series of FLC results – can look at the trend – but what if its first time? For FLC can look at Kappa and Lambda result. If one is very low (suppressed) but the other normal – suspicious. Urine albumin can vary greatly from one sample to the next 6 or 12 months later.

To avoid – Monitor trends of results carefully
Assay on dilution if suspected.

Roche have urine albumin method with 'built in' Antigen XS check, otherwise should dipstick for protein or run a total protein assay at the same time

Matrix

Lipemia/ other insoluble particles will also cause light scattering so will interfere.

Assay on dilution or look at rate assays if systemic problem.

Care when calibrating. Non linear calibration curve.