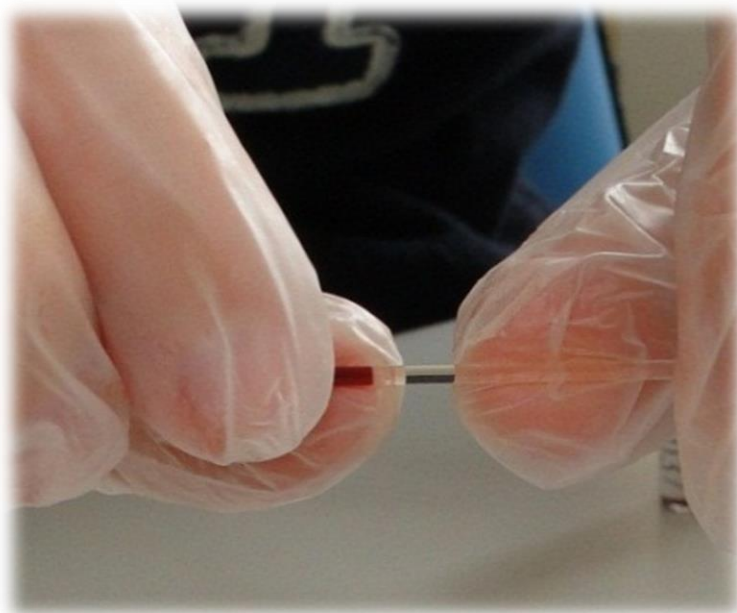


# Measuring Total Solids (Total Proteins) Using a Refractometer



## Disclaimer

A series of booklets has been developed by the Clinical Skills Lab team (staff, recent graduates and students) from the School of Veterinary Sciences, University of Bristol, UK.

Please note:

- Each booklet illustrates one way to perform a skill and it is acknowledged that there are often other approaches. Before using the booklets students should check with their university or college whether the approach illustrated is acceptable in their context or whether an alternative method should be used.
- The booklets are made available in good faith and may be subject to changes.
- In using these booklets you must adopt safe working procedures and take your own risk assessments, checked by your university, college etc. The University of Bristol will not be liable for any loss or damage resulting from failure to adhere to such practices.

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Year Group: BVSc3 +



## Equipment list: Measuring Total Solids

### Equipment for this station:

- Blood sample in microhaematocrit (capillary) tube
- Refractometer
- Gloves
- Paper towel or tissue

### Considerations for this station:

- Wear gloves
- Refer to booklets for associated skills and sample preparation i.e.
- Preparing a blood sample in a microhaematocrit tube (for a PCV):
  - ‘CSL\_L00 Packed Cell Volume’
- Using a refractometer:
  - ‘CSL\_L04 Urinalysis Specific Gravity’
- Microhaematocrit tubes should be disposed of in a sharps bin
- Anything contaminated with blood must be disposed of in a clinical waste bin (unless it is sharps)
- Handle glass capillary tubes with care. Instructions For handling capillary tubes can be found in ‘CSL\_R01 Microscope’ slides (in the CSL)
- Make sure you are familiar with ‘CSL\_I02 Lab Area Rules’: wear a correctly fastened lab coat/scrub top, mop up any spills and spray work surface with 1% Virkon and wash hands in the hand wash sink

Anyone working in the Clinical Skills Lab must read the ‘CSL\_I01 Induction’ and agree to abide by the ‘CSL\_I00 House Rules’ & ‘CSL\_I02 Lab Area Rules’

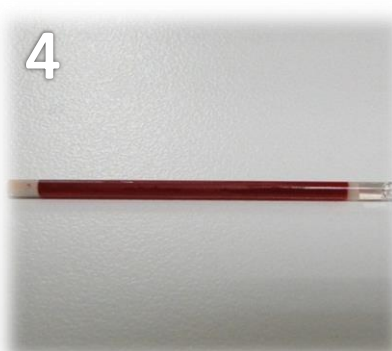
Please inform a member of staff if equipment is damaged or about to run out.



1. Prepare blood sample in a microhaematocrit (capillary) tube. Refer to booklet: **'CSL\_L00 Packed Cell Volume'**
2. Calibrate refractometer. Refer to booklet: **'CSL\_L04 Urinalysis Specific Gravity'**



3  
Break the capillary tube near the bottom of the plasma fraction. This will give two fragments, one containing the plasma and the other the packed cells.



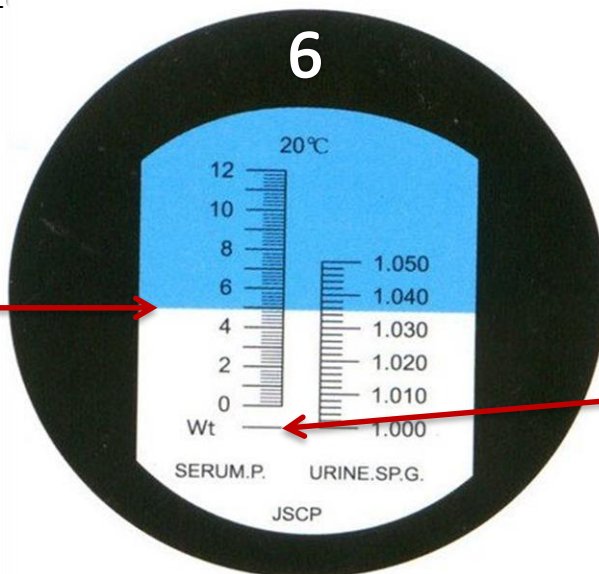
4  
Discard the packed cells fragment into a sharps bin. Note how the break is in the plasma fraction.



5  
Dab the unbroken end of the fragment containing the plasma onto the refractometer surface. Be careful not to cut yourself on the sharp edges of the glass.

Read the refractometer to determine the plasma protein. If the distinction between the blue and the white is blurry this can mean that there is insufficient plasma on the reading plate. Try pressing the lid down firmly as this can make the line clearer.

Refractometers may have 2 or 3 scales. Ensure you read from the correct one marked e.g. 'serum p' 'Wt', 'TS' (total solids) ('g/100ml')



6  
The division between the blue and the white is the line from which readings should be taken.

When only distilled water is placed onto the reading plate, the line should appear at this point if properly calibrated.



## Resetting the station:

### Measuring Total Solids (Total Proteins) Using a Refractometer

1. Dispose of any glass in a sharps bin
2. Clean any equipment contaminated with blood e.g. using Virkon spray and a paper towel or disinfectant wipe
3. Clean the refractometer by rinsing it with water and drying it with a clean paper towel
4. Wipe up any spills and leave the area clean and tidy
5. Dispose of any consumables contaminated with blood etc. in a clinical waste bin
6. Put the refractometer back in its box
7. Return all equipment to its storage container

*Station ready for the next person:*



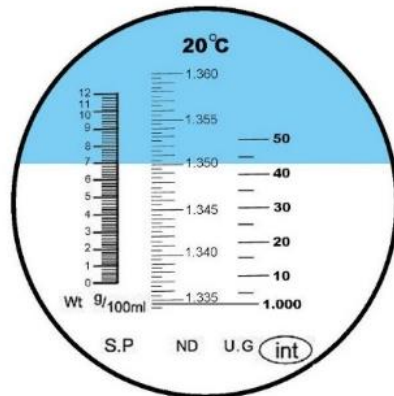
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# Example Readings: Test

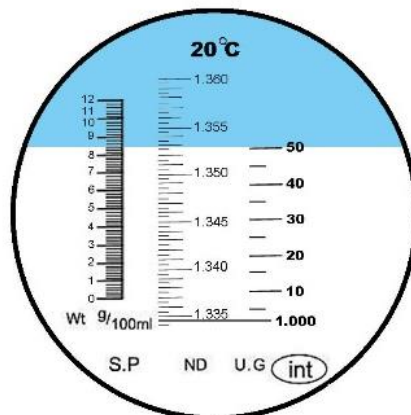
## Measuring Total Solids (Total Proteins) Using a Refractometer

Test yourself by reading the total solids results of the following 3 samples. The answers are on the next page.

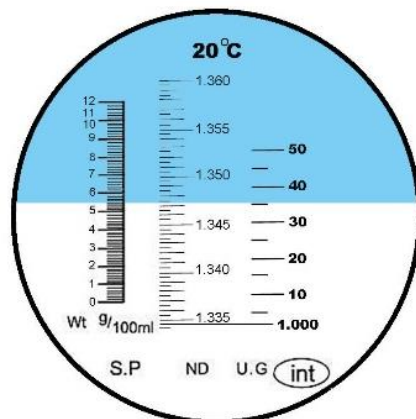
A



B



C





Answers:

A = 70 grams/litre

B = 85 grams/litre

C = 55 grams/litre

The normal ranges for total solids as referenced from Merck  
Veterinary Manual are:

Dog 60 – 75 grams/litre

Cat 60 – 75 grams/litre



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## I wish I'd known:

Measuring Total Solids (Total Proteins)  
Using a Refractometer

- A refractometer can be used to measure total solids (total proteins) in a serum or a plasma sample.