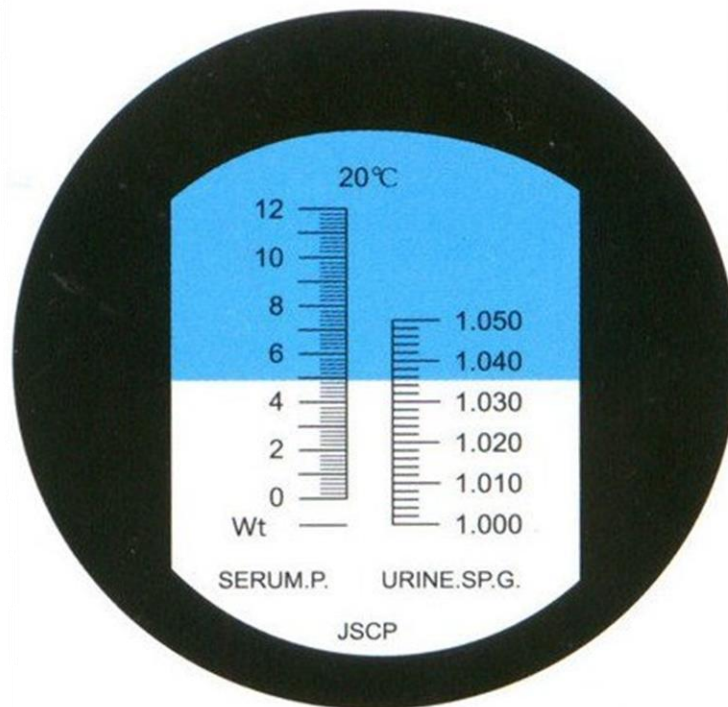


# Urinalysis: Specific Gravity



## 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.
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Year Group: BVSc3 +



## Equipment list: Urinalysis: Specific Gravity

### Equipment for this station:

- Refractometer
- Distilled water
- Paper towel or tissue
- Urine (real or substitute)
- Syringes
- Gloves

### Considerations for this station:

- Wear gloves
- Anything contaminated with urine (tissue, paper towel, etc.) must be disposed of in clinical waste
- N.B. Substitute urine (rather than real urine) may be used in the Clinical Skills Lab
- Make sure you are familiar with 'CSL\_I02 Lab Area Rules' and 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.
- A refractometer is also used to measure total solids (total protein) in plasma (or serum). Refer to booklet 'CSL\_L01 Total Solids'.

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.



# Clinical Skills: Urinalysis: Specific Gravity

## 1 Calibration dial



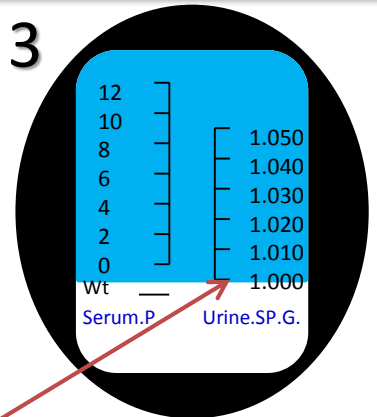
To calibrate the refractometer, firstly ensure that it is clean. Wipe the surface with a clean tissue and distilled water.

## 2



Place a small volume (one or two drops) of distilled water onto the reading surface and close the lid.

## 3



Look through the eye piece and ensure that the line between the blue section and the white section lies at 1.000 SPG. If it does not then adjust the calibration dial to bring the dividing line to 1.000. This will ensure the refractometer is accurate and the readings are reliable.

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

## 4

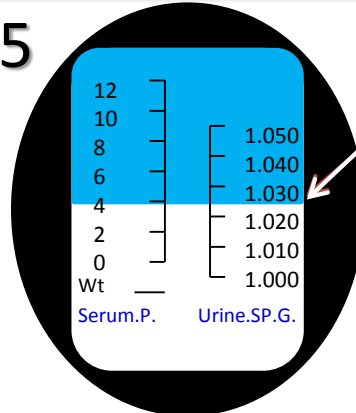


Wipe off the water with a clean tissue. This will ensure the urine is not diluted, affecting the results.

Gently invert the urine sample and place one or two drops of urine onto the reading surface using a clean syringe.

Inverting the urine will allow mixing of the sample to ensure an accurate sample is analysed.

## 5



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

Close the lid and look through the eye piece. Read off the specific gravity e.g. in the image above the Urine Specific Gravity is 1.024.

Refractometers may have 2 or 3 scales – make sure you read the correct one, usually marked 'S.G' 'U.G' or 'USG' for urine specific gravity.

N.B. A refractometer can also be used to measure total solids (total protein) in plasma. Refer to booklet 'CSL\_L01 Total Solids'.



## Resetting the station: Urinalysis: Specific Gravity

1. Clean the refractometer by rinsing it with water and drying it with clean paper towel
2. Put the refractometer back in its box
3. Securely close the urine pot
4. Leave syringes in the tray (if real urine was used dispose of used syringe/s in a clinical waste bin)
5. Wipe up any spills and leave the area clean and tidy
6. Anything contaminated with urine (e.g. tissue, paper towel, etc.) must also be disposed of in a clinical waste bin

*Station ready for the next person:*



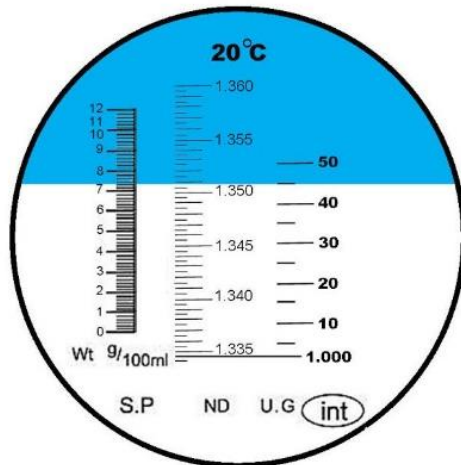
Please inform a member of staff if equipment is damaged or about to run out.



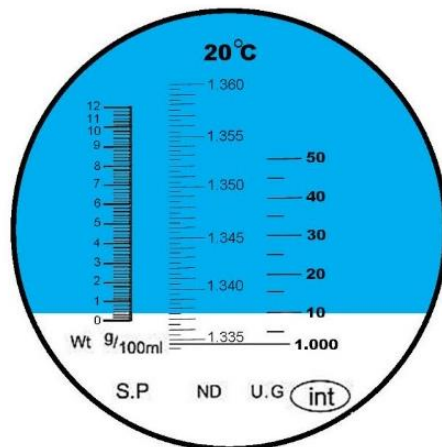
# Example Readings: Test Urinalysis: Specific Gravity

Test yourself by reading the Urine Specific Gravity results of the following 3 samples from dogs. The answers are on the next page.

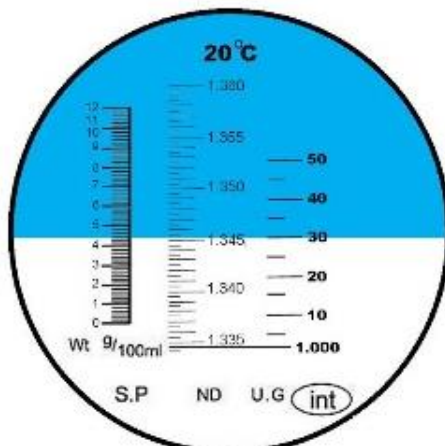
A



B



C





Answers:

A = 1.045 (within normal range)

B = 1.010 (lower than normal range)

C = 1.030 (within normal range)

The normal ranges for Urine Specific Gravity (USG) as referenced from Merck Veterinary Manual are:

Dog 1.016 – 1.060

Cat 1.020 – 1.040

Urine Specific Gravity (USG) interpretation:

USG is interpreted based on the hydration status of the patient and the blood serum blood urea nitrogen and creatinine concentrations.

N.B. Normal USG can range widely in an adequately hydrated dog or cat and it is assumed the animal does not have renal impairment if relevant blood biochemistry values are within the normal ranges.



- If the distinction between the blue and the white is blurry this can mean that there is insufficient urine on the reading surface. Try pressing the lid down firmly as this can make the line clearer.
- You can focus the refractometer by twisting the eyepiece
- Attention to detail is key to get an accurate reading from the refractometer. It is important to:
  - Calibrate the refractometer before use
  - Ensure the reading surface is clean and dry
  - Mix the urine before taking a sample to place on the reading surface
  - Read the correct scale on the display