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and

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and

Fisheries and Oceans Canada
Sea Lamprey Control Centre
1219 Queen Street East
Sault Ste. Marie, Ontario P6A 2E5
Canada

INSTRUMENT OPERATING PROCEDURE

INSTRUMENT:

Ammonia Photometer

MODEL:

HI97700

MANUFACTURER:

Hanna Instruments

PRECAUTIONS:

POTENTIAL INTERFERENCES

Use a clean cuvette for all readings.

Use a lens cleaning cloth when using cuvettes.

SAFETY

No special safety precautions.

PROCEDURES:

- I. Preparation of the Hanna Photometer for use. Photometer is equipped with a tutorial mode that will walk user through the steps of the analysis.
 - A. Turn on the On/Off switch. Verify that the display becomes active, if tutorial mode is enabled, a pop-up window will indicate that mode. The correct units for this measurement should be mg/L NH₃. Ensure NH₃ is displayed, not NH₃-N or NH₄⁺.
To toggle tutorial mode on/off or change units, press  and change the chemical form for the units or the “setup” menu for the tutorial mode.
 - B. The home screen will be displayed showing “ - - - mg/L, Ammonia LR (NH₃)” when the photometer is ready.
 - C. Calibration should be checked approximately every month. The kit should include 2 standards: a zero, and a 1.5 mg NH₃-N. To check the calibration, from the home menu, zero the instrument using the zero standard, then read the 1.5 mg/L standard. Make sure the units are NH₃-N. If the reading is outside of 1.45-1.55, re-calibrate the unit by pressing “CAL Check” and “Calibrate”. Follow the instructions.
- II. Sample Procedure.
 1. On the home screen touch “Measure” to begin. If tutorial mode is enabled, you will see “Step 1/15...”. Follow the steps as displayed pressing “Next” as you complete them. The steps will be the same as follows.
 2. Fill a cuvette to the line (10 ml). Cap cuvette, dry and clean the cuvette.
 3. Insert cuvette into photometer and spin until the cuvette drops into its seat.
 4. Press “Zero”.
 5. Remove cuvette from photometer and add 4 drops of Reagent A. Replace cap and invert 5 times to mix well.
 6. Add 4 drops of Reagent B, replace cap, and invert 5 times to mix well. Dry and clean side of cuvette.
 7. Insert cuvette into photometer and spin until the cuvette drops into its seat.
 8. Press “Read”. A 3 minute 30 second timer will start, and a reading will automatically be taken when the timer expires.

9. Value will be reported to 2 decimal places.
10. Using the water pH value and temperature, multiply reported value by fraction found in the ammonia ionization chart

pH	Temperature													
	42.0 (°F)	46.4	50.0	53.6	57.2	60.8	64.4	68.0	71.6	75.2	78.8	82.4	86.0	89.6
	6 (°C)	8	10	12	14	16	18	20	22	24	26	28	30	32
7.0	.0013	.0016	.0018	.0022	.0025	.0029	.0034	.0039	.0046	.0052	.0060	.0069	.0080	.0093
7.2	.0021	.0025	.0029	.0034	.0040	.0046	.0054	.0062	.0072	.0083	.0096	.0110	.0126	.0150
7.4	.0034	.0040	.0046	.0054	.0063	.0073	.0085	.0098	.0114	.0131	.0150	.0173	.0198	.0236
7.6	.0053	.0063	.0073	.0086	.0100	.0116	.0134	.0155	.0179	.0206	.0236	.0271	.0310	.0369
7.8	.0084	.0099	.0116	.0135	.0157	.0182	.0211	.0244	.0281	.0322	.0370	.0423	.0482	.0572
8.0	.0133	.0156	.0182	.0212	.0247	.0286	.0330	.0381	.0438	.0502	.0574	.0654	.0743	.0877
8.2	.0210	.0245	.0286	.0332	.0385	.0445	.0514	.0590	.0676	.0772	.0880	.0998	.1129	.1322
8.4	.0328	.0383	.0445	.0517	.0597	.0688	.0790	.0904	.1031	.1171	.1326	.1495	.1678	.1948
8.6	.0510	.0593	.0688	.0795	.0914	.1048	.1197	.1361	.1541	.1737	.1950	.2178	.2422	.2768
8.8	.0785	.0909	.1048	.1204	.1376	.1566	.1773	.1998	.2241	.2500	.2774	.3062	.3362	.3776
9.0	.1190	.1368	.1565	.1782	.2018	.2273	.2546	.2836	.3140	.3456	.3783	.4116	.4453	.4902
9.2	.1763	.2008	.2273	.2558	.2861	.3180	.3512	.3855	.4204	.4557	.4909	.5258	.5599	.6038
9.4	.2533	.2847	.3180	.3526	.3884	.4249	.4618	.4985	.5348	.5702	.6045	.6373	.6685	.7072
9.6	.3496	.3868	.4249	.4633	.5016	.5394	.5762	.6117	.6456	.6777	.7078	.7358	.7617	.7929
9.8	.4600	.5000	.5394	.5778	.6147	.6499	.6831	.7140	.7428	.7692	.7933	.8153	.8351	.8585
10.0	.5745	.6131	.6498	.6844	.7166	.7463	.7735	.7983	.8207	.8408	.8588	.8749	.8892	.9058
10.2	.6815	.7152	.7463	.7746	.8003	.8234	.8441	.8625	.8788	.8933	.9060	.9173	.9271	.9389

Fraction of un-ionized ammonia in aqueous solution at different pH values and temperatures. To calculate the amount of un-ionized ammonia present, the Total Ammonia Nitrogen (TAN) must be multiplied by the appropriate factor selected from this table using the pH and temperature from your water sample. Some interpolation will be required depending on exact pH and temperature conditions of each stream. Chart from Francis-Floyd, R. et al. 2014. Ammonia in Aquatic Systems. University of Florida IFAS Extension.

Example:

Larry the lamprey thought the water tasted a little funny. He decided to measure the ammonia-nitrogen (NH₃-N) in his water. Using the Hanna spectrophotometer, he received a reading of 2.98 mg/L. His buddies Curly and Moe told him the pH and temperature was 7.92 and 15°C. Looking at the chart, 7.92 is between 7.8 and 8.0 and 15° is between 14° and 16°. What is a curious lamprey supposed to do?? To simplify the calculation, let's assume a pH of 7.9. We need to find the number in the chart exactly between 7.8 and 8.0, and 14 and 16.

	14°	16°
7.8	.0157	.0182
8.0	.0247	.0286

All we have to do is average the 4 numbers from the chart.

$$\frac{(0.0157 + 0.0182 + 0.0247 + 0.0286)}{4} = 0.0218$$

Finally, we multiply that number by the spec reading of 2.98 to get our final answer

$$Total \text{ NH}_3\text{N} \times \text{chart value} = 2.98 \times 0.0218 = 0.06 \frac{\text{mg}}{\text{L}}$$

MAINTENANCE:

- A. Minimal maintenance is required or possible.
- B. Troubleshooting is available in the User manual.

REFERENCE:

HI97700 Ammonia Low Range Photometer Instruction Manual

This procedure has been reviewed and approved by the undersigned representatives of the U.S. Fish and Wildlife Service and Fisheries and Oceans Canada.

REVIEWED/APPROVED _____ DATE _____
Program Manager (Canada)

REVIEWED/APPROVED _____ DATE _____
Field Supervisor (US)

IOP 003.11

Effective Date: 3/04/2025

Page 5 of 5

Revision No.	Date	Person(s) Responsible	Description
3.11	3/4/25	Benson Solomon	Addition of ammonia ionization chart