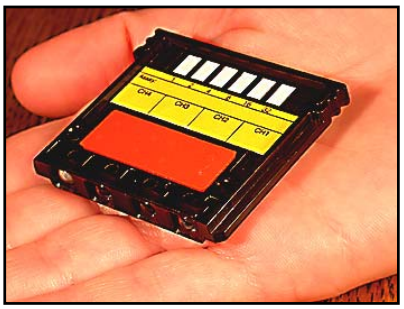
RAPTOR™ Assay Coupons



The RAPTOR™'s disposable bioassay coupon incorporates four polystyrene waveguide biosensors sealed into a credit card-size injection molded polycarbonate shell (See Figure 1). The shell houses the waveguides, a series of flow channels to direct fluids through the coupon, and a resealable needle septum that is used to connect fluids in the RAPTOR™ to the coupon channels.

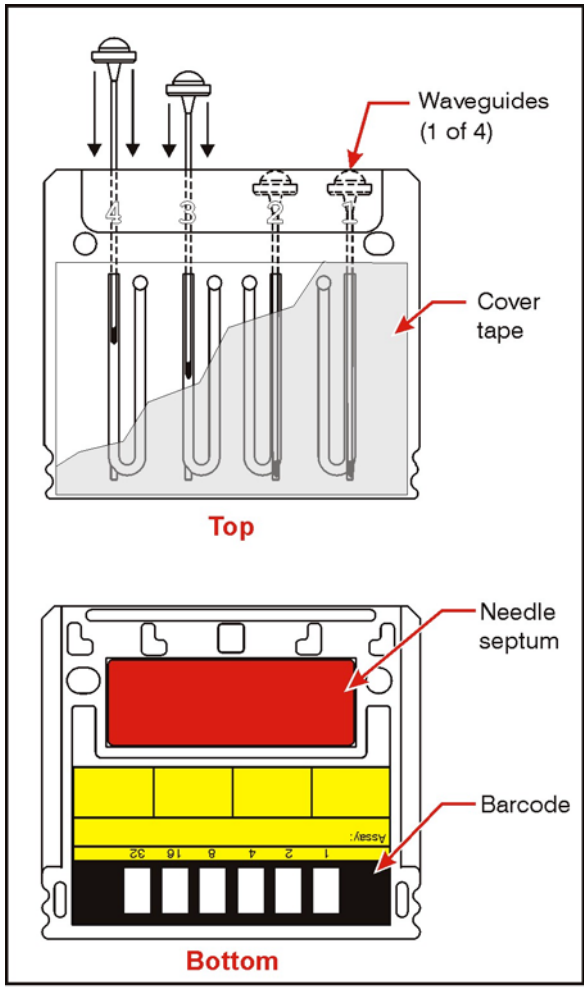


Figure 1: Key features of RAPTOR™ bioassay coupon.

Each coupon is also supplied with four 1cc vials of reuseable reagent (in freeze-dried form) that are automatically re-hydrated by the RAPTOR™ fluidics before first being used in the assay process. The liquefied reagents are stored in these vials within a temperature-controlled compartment in the RAPTOR™ when not needed. Many research-oriented users mix these reagents together into one 'cocktail," but there is a small risk that some reagents may interact: Research International has taken the conservative approach of providing the architecture needed to separately store and dispense them.

In addition to providing controlled flow over the sensor elements, the coupon incorporates an assay recipe identification system in the form of a bar code that is automatically read when the coupon is inserted into the instrument. This bar code identifies the type of assay to be run and allows up to 62 different and very sophisticated multi-step assays to be performed by untrained persons, since a microprocessor within the instrument performs and controls all assay procedure steps.

For the results-oriented user, pre-assembled coupons are available and Research International will also provide custom coupons for specific analytes on a quotation basis. All coupon components are available for sale separately for the hands-on researcher, and the RAPTOR™ manual provides detailed information on how to coat waveguides and assemble coupons.

The Tables on the back of this page provide information on analytes that have been successfully detected using the RAPTOR™ technology, as well as general coupon specifications.

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Table 1: Analyte Target Sheet[1]		
Pathogen	**Description/Media**	**Limit of Detection**
Ricin	Protein toxin / Water	1 ng/ml
Staphylococcal enterotoxin B	Protein toxin / Water	0.1 – 0.5 ng/ml
Bacillus anthracis (vegetative Sterne cells)	Vegetative cells / Whole blood	100 CFU/ml
Bacillus anthracis (irradiated Ames spores)	Irradiated spores / Water	5 x 10^4 CFU/ml
Escherichia coli O157:H7	Vegetative cells / Hamburger slurry	100 – 1000 CFU/ml
Giardia lamblia	Vegetative cells / Drinking water	5 x 10^4 CFU/ml
Yersinia pestis F1 antigen	Capsular protein from cell wall / Water	1 ng/ml
Botulinium toxin	Protein toxin / Water	1 – 10 ng/ml
Ovalbumin	Protein toxin simulant / Water	5 ng/ml
Cholera toxin	Protein toxin / Water	0.1 – 1 ng/ml
Protein C	Blood component / Blood Plasma	160 ng/ml
Bacillus globigii	Sporulated bacteria simulant / Water	2.5 x 10^4 CFU/ml
Brucella abortus	Vegetative cells / Water	7 x 10^4 CFU/ml
Francisella tularensis	Vegetative cells / Water	5 x 10^4 CFU/ml
Salmonella typhimurium	Vegetative cells / Water	2 x 10^4 CFU/ml
Vaccinia virus	Pox virus / Water	10^5 PFU/ml
Cocaine	Drug of abuse / Urine	50 ng/ml
TNT	Explosive / Water	440 ng/ml

Table 2: General Coupon Specifications[2]	
Parameter	**Value**
Assay method	Antibody-based sandwich bioassay on the surface of a disposable plastic waveguide.
Number of pathogens monitored in a single coupon	4 waveguide sensors/coupon. Each is specific for a single pathogen. The factory-installed sensors may be for 4 different pathogens, or some pathogens may be repeated to improve statistical certainty.
Assay time	10 to 15 minutes
False positive rate	1.25 – 2.5% per waveguide. If multiple waveguides are used in the same coupon the false positive rate decreases as the product of the single waveguide rate.
Number of times a coupon can be reused	Minimal degradation after 30 negative assays. Coupons should be replaced if a strong positive response is registered.
Maximum operating time	8 to 12 hours typical if all coupon assays have been negative.
Maximum use temperature	Antibodies rapidly degrade above 40° C
Storage recommendations	Refrigeration at 4° C provides longest shelf life.
Shelf life	Research grade[3]: 1 month, typical at 20° C Production qualified: 3 to 6 months typical at 20° C
Reagents	Each coupon is supplied with 4ea. 1 cc vials of freeze-dried fluorescent reagent that are installed in the RAPTOR.
General precautions	Keep coupons out of strong sunlight or high temperatures. Do not damage inset lenses at the coupon's thicker end.

(1) RAPTOR System bioassays performed by various research groups. Production-qualified assays can be expected to exhibit similar or better sensitivity. RI does not warranty the accuracy of measurements made by these third-party researchers or that the protocols used are practical for all field applications. This data is for informational purposes only.

(2) Certain specifications such as shelf life and thermal stability are not expected to vary substantially from one pathogen to another. These generic Specifications are presented for antibody-based coupons used in a sandwich assay format.

(3) Research grade coupons are made using small-lot lab bench methods and have not been subjected to the same level of quality control and assay optimization as production-quality coupons.