

## FORENSIC BIOLOGY PROTOCOLS FOR FORENSIC STR ANALYSIS

QIAGEN EZ1 Advanced XL DNA Extraction from Bloodstains and Other Casework Samples		
Status:Published		Document ID: 15565
DATE EFFECTIVE 03/30/2023	APPROVED BY Nuclear DNA Technical Leader	PAGE 1 OF 6

# QIAGEN EZ1 Advanced XL DNA Extraction from Bloodstains and Other Casework Samples


This extraction is applicable for exemplar samples and all casework evidence samples **EXCEPT** suspected semen samples. Refer to the Evidence Examination manual to determine the appropriate sample size to submit for extraction.

If multiple EZ1 extractions will be performed at a time by one analyst, it is suggested that the incubation times for each set be staggered by about 1 hour to allow for sufficient processing time.

## 1 LIMS Pre-Processing

- 1.1 In the **Analytical Testing » Test Batches** tram stop, select the appropriate extraction assay and Click **Edit**

Note: If you are creating a new extraction test batch use the **New Test Batch** tram stop followed by the create new test batch wizard. In that wizard include the following information: description, functional group, analysis, batch configuration, and test batch type (case test batch).

- 1.2 If necessary, click **Add Unknowns** and select any samples that need to be included on the test batch. Controls are present in the batch configuration.
  - 1.2.1 If additional controls are needed, click **Add QC Samples**
- 1.3 Select All Input Samples » click Add Output Sample »  » 1:1 » click Select and Return » click Ok » click Create
- 1.4 Review the batch setup and complete the Batch Setup Review performed by tab.

## 2 Procedure

- 2.1 Obtain labeled cuttings in 1.5 mL tubes. Compare your sample labels and tube tops to the input sample list in LIMS, and confirm that you have the correct samples. The maximum number of samples per batch is 14 (13 samples + 1 eneg).
- 2.2 Fill out the incubation performed by tab in LIMS. This will add the date and time to the extraction negative for the batch.
- 2.3 Obtain one 1.5 mL tube for your extraction negative, and label it with the associated **input** LIMS label and tube top label.

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Status:Published		Document ID: 15565
DATE EFFECTIVE 03/30/2023	APPROVED BY Nuclear DNA Technical Leader	PAGE 2 OF 6

- 2.4 Retrieve reagents for cell digestion and record the lot numbers in LIMS.
- 2.5 Select the ATL buffer aliquot and QiaProK reagents and click “Calculate amount.” Use the volumes listed in the “Needed Amount” column to prepare the master mix (LIMS will calculate 1.2x the number of samples).

<b>Digestion master mix (per sample)</b>		
Diluted ATL ( $\mu$ l)	Proteinase K (Qiagen) ( $\mu$ l)	Total
480	20	500

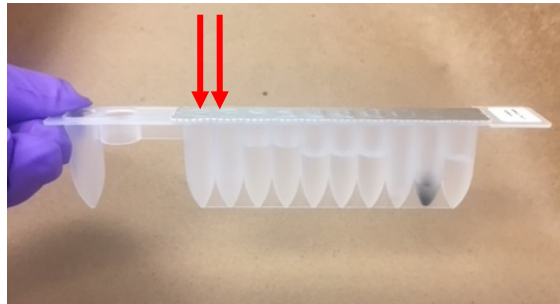
- 2.6 Add 500 $\mu$ l of master mix to each sample and the negative control.
- 2.7 Vortex each sample tube briefly to mix.
- 2.8 Incubate all samples at 56°C for 1.5-2 hours at 900rpm using a thermomixer. Record the thermomixer temperature and usage log for the instrument in LIMS.
- 2.9 During the incubation:
- 2.9.1 Prepare your sample tubes:
- 2.9.1.1 Print your labels. For the entire protocol you will need:
- Two copies of the input sample labels
  - One copy of the output sample labels
- 2.9.1.2 Obtain your tubes and label them:
- Spin baskets and 1.5 mL collection tubes – **input** labels
  - **2 mL** screw cap tubes – **input** labels
  - QIAGEN 1.5 mL screw cap elution tubes – **output** labels
- 2.9.2 Load the EZ1 instrument with the appropriate reagent strips and tips.
- 2.9.2.1 Complete the usage log in LIMS for the EZ1 instrument. Fill out the performed by tab for extraction.
- 2.9.2.2 Remove both the tube rack and cartridge rack from the EZ1.
- 2.9.2.3 Obtain reagent cartridges and record the lot number in LIMS.

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Status:Published		Document ID: 15565
DATE EFFECTIVE 03/30/2023	APPROVED BY Nuclear DNA Technical Leader	PAGE 3 OF 6

Note: More than one reagent lot may be used if there are not enough individual cartridges available for your full batch. Please indicate in the batch comments the additional lot number and for which samples it was used.

- 2.9.2.4 Invert reagent cartridges twice to mix the magnetic particles. Then tap the cartridges to deposit the reagents at the bottoms of their wells. Check that the magnetic particles are re-suspended. Also, visually inspect each reagent well. All wells except the last two must contain liquid.



- 2.9.2.5 Slide the EZ1 reagent cartridges into the cartridge rack, one cartridge for each sample being run. The cartridge label side should be at the blunt end of the rack, closest to the tube rack when loaded in to the instrument. Place rack in EZ1.



Reagent cartridge rack with cartridges loaded

- 2.9.2.6 Assemble EZ1 tips and tip holders. Place them in row 2 of the EZ1 tube rack.
- 2.10 Approximately 10 minutes before the incubation is completed, place the bottle of MTL buffer in the incubator to warm it to approximately 65°C.
- 2.11 Once the incubation is completed, briefly centrifuge the sample tubes to remove condensation from the tube caps.

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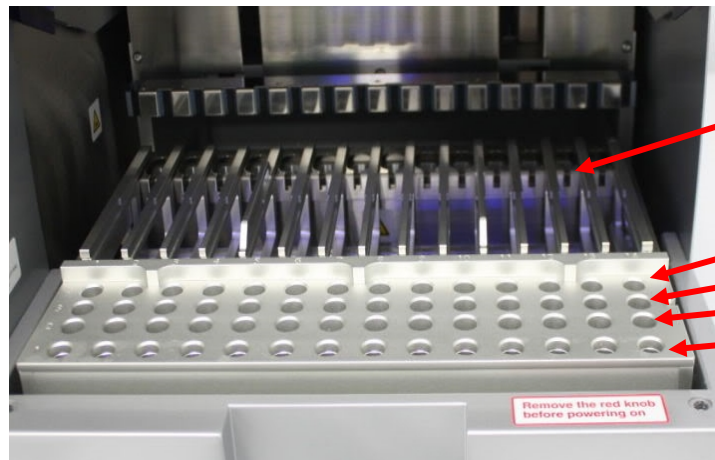
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Status:Published		Document ID: 15565
DATE EFFECTIVE 03/30/2023	APPROVED BY Nuclear DNA Technical Leader	PAGE 4 OF 6

- 2.12 **Tube Transfer WITNESS:** Have a witness verify three sets of tubes:
- 2.12.1 Original incubation tube (**input** sample labels and tube top)
  - 2.12.2 Spin basket tube (**input** sample labels)
  - 2.12.3 2 mL screw cap tube (**input** sample labels)
- 2.13 Prepare 10% bleach, distilled water, and 70% alcohol in three 50mL conical tubes. Clean a pair of forceps by dipping the forceps in each of the three tubes briefly and then drying with a fresh lint free wipe.
- 2.14 For each sample, transfer the substrate using the forceps to its associated spin basket tube. Clean and dry forceps between each sample
- 2.15 Pipette mix the sample lysate within the incubation tube and then pipette the entire lysate volume (~500µl) over the top of the substrate in the spin basket. Close the tube top over the spin basket. Repeat this step for each sample, cleaning and drying the forceps between each sample.
- 2.16 Spin the substrates in spin baskets at 13,200 rpm for 2 minutes.
- 2.17 Remove and discard the spin baskets (including the swab/stain remains) using forceps, taking care to avoid bubbles at the rim of the open tube. Clean and dry forceps between each sample.
- 2.18 Transfer the lysate from the spin basket tube to the associated 2 mL screw cap tube.
- 2.19 Remove the warmed MTL from the incubator and add 400µL of the warmed MTL buffer and 1 µL carrier RNA to each 2 mL sample tube, pipette mixing as needed, to ensure mixing of the MTL with the lysate.
- 2.20 To avoid possible precipitation, proceed directly with EZ1 DNA extraction protocol while the sample lysates are still warm.
- 2.21 **EZ1 Setup WITNESS:** Have a witness verify the lysates, elution tubes, and loading of the Extraction Negative and samples on to the EZ1.
- 2.21.1 Remove and discard the cap and load the sample tubes into row 4 of the EZ1 tube rack, reading the LIMS **input** label.
  - 2.21.2 Next, load the labeled elution tubes to row 1 of the EZ1 tube rack, reading the LIMS **output** label and tube top and removing the screw cap as you load each sample.
  - 2.21.3 Place tube rack into the EZ1. Make sure that the tube rack is loaded onto the instrument after the cartridge rack.

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DATE EFFECTIVE 03/30/2023	APPROVED BY Nuclear DNA Technical Leader	PAGE 5 OF 6

- 2.21.4 Witness should verify that all samples, reagents, and racks are loaded appropriately on the instrument.



Reagent cartridge rack – place into instrument **first**

Tube rack:

**Row 4** – sample tubes

**Row 3** – empty

**Row 2** – pipette tips

**Row 1** – elution tubes

EZ1 Worktable

- 2.22 Run the EZ1 protocol for purification of the samples:
- 2.22.1 If needed, press “ESC” to get to the main menu.
  - 2.22.2 From the main menu press “Start” to begin a run.
  - 2.22.3 When asked if you would like to create a run report, press “ESC” to select no.
  - 2.22.4 Press “3” to select the large volume protocol.
  - 2.22.5 Press “2” to select elution in TE.
  - 2.22.6 Press “1” to select the 40µl elution volume.
  - 2.22.7 The screen will display instructions to ensure the EZ1 has been loaded properly.
  - 2.22.8 After checking each step, press “ENT” until the final step, and then press “Start.”
  - 2.22.9 The protocol run time is ~18 minutes.
- 2.23 Create a reference tube with 36µl of 0.1X TE<sup>-4</sup>.
- 2.24 After the protocol is completed, press “ENT” to continue.

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DATE EFFECTIVE 03/30/2023	APPROVED BY Nuclear DNA Technical Leader	PAGE 6 OF 6

- 2.25 Open the instrument door and remove the tube rack. Remove the 1.5mL elution tubes, capping each sample with the labeled tube top.
- 2.26 Compare each extract to the reference tube containing 36µl of 0.1X TE<sup>-4</sup>. If the volume appears lower than 36µl, measure the extract.
- 2.26.1 Measured volumes below 36µl should be documented in the Lab Supervisor Issues Log and the test batch comments.
- 2.26.2 Samples with measured volumes below 27µl must not proceed for further testing.
- 2.27 Discard all the used cartridges, lysate tubes, tip-holders and tips.

### 3 Clean the EZ1 instrument

- 3.1 DO NOT USE BLEACH ON THE INSTRUMENT, ONLY 70% ETOH WITH LINT FREE WIPES. NEVER SPRAY ETHANOL DIRECTLY ON THE INSTRUMENT.
- 3.2 Remove reagent cartridges and any waste; discard appropriately.
- 3.3 Wipe down the inside of the instrument using a lint free wipe and 70% EtOH.
- 3.4 Close the EZ1 door.
- 3.5 Follow the prompts on the screen to start a UV run, setting the time to 20 minutes.

Note: The UV lamps need a minimum switch-on time of 20 minutes. Do not interrupt a UV light cycle before 20 minutes have passed since it will reduce the lamp's lifetime. Do not touch UV lamp with your fingers. Call QA when a UV lamp needs to be replaced.

### 4 LIMS Post Processing

- 4.1 Select all output samples in the test batch in LIMS, and click **Data Entry**. Complete the data entry for all samples within LIMS.
- 4.1.1 Pass/Fail should be indicated for each sample.
- 4.2 In the data entry screen, all samples can be assigned a storage location in the next available storage box. Store the extracts at 2°C to 8°C or frozen.
- 4.2.1 Select all output samples in the test batch in LIMS, and click Review, scheduling any additional tests as needed.